IN THE UNITED STATES DISTRICT COURT

FOR THE EASTERN DISTRICT OF PENNSYLVANIA

CIVIL ACTION NO. 96CV-5903

STEVEN R. ARCH, WILLIAM BARNES, CIARAN McNALLY, CATHERINE POTTS, NORMA RODWELLER, BARBARA SALZMAN, EDWARD J. SLIVAK and JOHN TEAGLE, Plaintiffs, vs. THE AMERICAN TOBACCO COMPANY, INC., ET AL., Defendants.	CERTIFIED COPY Deposition of GARY BURGER VOLUME I

CONFIDENTIAL

TRANSCRIPT of testimony as taken by and before CATHY JONES, Shorthand Reporter and Notary Public of the State of North Carolina, at the law offices of Womble, Carlyle, Sandridge & Rice, 200 West Second Street, 12th Floor, Conference Room 12-A, Winston-Salem, North Carolina on Thursday, August 21, 1997, commencing at 9:21 a.m..

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* All exhibits

* No disk

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EXHIBITS

NUMBER	DESCRIPTION	IDENTIFICATION
1	7-10-97 fax transmittal with attachments (19 pages)	37
2	Article entitled "Conversion of Nicotine in Tobacco Smoke to Its Volatile and Available Free-Base Form through the Action of Gaseous Ammonia" (14 pages)	165
3	RJR "Strategic and Tactical Considerations concerning Ingredients," (21 pages)	206

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STIPULATIONS

Before testimony was taken, it was stipulated by and between counsel representing the respective parties as follows:

1. That any defect in the notice of the taking of this deposition, either as to time or place, or otherwise as required by statute is expressly waived, and this deposition shall have the same effect as if formal notice in all respects as required by statute had been given and served upon the counsel in the manner prescribed by law.

2. That this deposition shall be taken for the purpose of discovery or for use as evidence in the above-entitled action, or for both purposes.

3. That this deposition is deemed opened and all formalities and requirements with respect to the opening of the same, expressly including notice of the opening of this deposition, are hereby waived, and this deposition shall have the same effect as if all formalities in respect to the opening of the same had been complied with in detail.

4. That the undersigned Cathy Jones, Certified Court Reporter and Notary Public, is duly qualified and constituted to take this deposition.

5. Objections to questions, except as to the form thereof, and motions to strike answers need not be made during the taking of this deposition, but before any judge or any court of competent jurisdiction for the purpose of ruling thereon, or at any other hearing or trial of said case at which said deposition might be used, except that an objection as to the form of a question must be made at the time such a question is asked or objection is waived as to the form of the question.

6. That the signature of the witness to the deposition is hereby not waived.

7. That the Federal Rules of Civil Procedure shall control concerning the use of the deposition in court.

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THE VIDEOGRAPHER: We're going on the record. The time is 9:21 a.m. This is the videotaped deposition of Gary Burger, Ph.D. taken by the plaintiff in the matters of Steven R. Arch, et al., plaintiffs, versus the American Tobacco Corporation, et al., defendants, Civil Action 96 CV 5903 and the matter of William P. Perry and Sandra Perry, plaintiffs, versus Brown & Williamson Tobacco Corporation, et al., defendants, Civil Action 2-473-95. This deposition is being held at the offices of Womble, Carlyle, Sandridge and Rice, 200 West Second Street, Winston-Salem, North Carolina on Thursday, August 21st, 1997.

My name is John Girdler. I'm the video specialist. The court reporter is Cathy Jones. We're here in connection with Waga and Spinelli with offices located at 4 Becker Farm Road, Roseland, New Jersey. Counsel will now state their appearances for the record and the court reporter will swear in the witness.

MS. EASON: My name is Marcia Eason and I represent Lorillard Tobacco Company in the case pending in Tennessee, William and Sandra Perry. The record will reflect that J. D. Lee cross-noticed the deposition of Dr. Gary Burger to the case pending in

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Tennessee. The record will also reflect that there is no counsel admitted in Tennessee court who is present today. J. D. Lee, counsel for William Perry and Sandra Perry, has not appeared and apparently will not participate and none of the Tennessee counsel will participate either.

MR. BELASIC: I'm Mark Belasic for defendant, R. J. Reynolds Tobacco Company in the Arch case. I didn't know anything about Mr. Lee allegedly cross-noticing this deposition in the Perry case. I certainly didn't receive such depo notice. And this deposition is noticed for two days in the Arch case and after those two days, it's over. And that's our position on the record.

MR. MAISTROS: Jack Maistros. I represent the plaintiffs in Arch.

MS. KNISELY: Sherrice Knisely. I represent the plaintiffs in Arch.

MS. EASON: I will also be leaving the deposition at this time. Thank you.

(MS. EASON EXITS CONFERENCE ROOM AT 9:22 A.M.)

GARY THOMAS BURGER, D.V.M.,

having been duly sworn, was examined and testified as follows:

DIRECT EXAMINATION

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BY MR. MAISTROS:

Q. Good morning, Mr. Burger. My name is Jack Maistros. I represent the plaintiffs in this action. I'll be asking you some questions today and perhaps Sherrice Knisely will be asking you some questions tomorrow, okay?

If you don't understand my question, tell me. If you want to stop, take a break, tell me. If you want to confer with your counsel, let me know, okay?

A. Okay.

Q. Could you please state and spell your full name?

A. Gary Thomas Burger. G-a-r-y, T-h-o-m-a-s, B-u-r-g-e-r.

Q. And your date of birth?

A. November the 29th, 1948.

Q. And your current address?

A. 4800 Bent Ridge Lane, Clemmons, North Carolina, 27012.

Q. And how long have you resided there?

A. Approximately 13 years, just shy of 13 years.

Q. Any plans to move in the near future?

A. No, I do not.

Q. Any plans to voluntarily come to

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Philadelphia for this trial?
A. No plans to do so.
Q. Has anyone asked you to be a witness in this trial?
A. No, they have not.
Q. Are you married?
A. Yes, I am.
Q. And what's your wife's name?
A. Janis, J-a-n-i-s.
Q. And how long have you been married?
A. Twenty-eight years --
Q. Any children?
A. -- next week.
Q. Any children?
A. Yes, I have a son, T. J., Thomas Joseph, who's 23 years of age and a daughter, Ellen, who's 18.
Q. Ever in the military?
A. Yes, I have.
Q. What years and what service?
A. I was in the army and my last year of veterinary school was the first year of service and that was in 1971 and I got out in June of 1976.
Q. That's full-time in the army, '71 to '76?
A. That's correct.
Q. Honorable discharge?

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A. Yes.

Q. What was your rank?

A. Captain.

Q. Where did you go to high school?

A. I entered high school in southeast Oklahoma, a town called Hartshorne. And my parents and I moved to Tallulah, Louisiana for my last two years of high school, so I graduated from Tallulah High School.

Q. In what year?

A. 1966.

Q. And then what did you do in '66?

A. I went to -- immediately in a summer session, I went to Louisiana State University.

MR. BELASIC: I'm sorry. You've lost your microphone, Dr. Burger.

THE WITNESS: I apologize. Let me state again.

A. After graduating in 1966, I went to Louisiana State University.

Q. And how long were you at LSU?

A. Two years approximately because I went to summer sessions. It was not two calendar years, but two years' worth of course work.

Q. Did you get a degree in '68?

A. No, I transferred to Oklahoma State University,

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where I finished my bachelor's degree and got my doctorate of veterinary medicine.

Q. In what year?

A. 1972 for my doctorate. 1970 to finish my requirements for bachelor.

Q. Do you have any other degrees, educational degrees?

A. No, I do not. Just a bachelor of science in agriculture and a doctorate in veterinary medicine.

Q. Did you use your degrees or your doctoral in the army?

A. Yes, I did. I did a pathology residency in the army. Got my boards in pathology and did my residency in that discipline while I was in the army and finished it up when I was at the National Toxicology Labs. I also used my degree in veterinary medicine to do lab animal research.

Q. In the army?

A. In the army.

Q. Okay. First, what did you get certified in?

A. It's a certification in pathology and comparative pathology. It's referred to as ACVP, American College of Veterinary Pathologists.

Q. What does the certification mean?

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A. Well, it's widely sought after by companies and universities for scientists who are familiar with disease, study disease, study prevention of disease or therapies or vaccines. It's also a popular certification for drug companies, food companies to use in toxicological research.

Q. Is that a separate test that you have to take by a national association?

A. No, it is not. It is one of the subdisciplines of the ACVP. I was always interested in toxicology. I taught some courses in veterinary school.

Q. I --

A. And I did research there.

Q. I'm sorry. The ACVP, is that a test you have to take? Or a --

A. Yes, it is. A board certification. Quite tough.

Q. And what year did you receive that?

A. 1980.

Q. And what is the National Toxicology Labs?

A. It's referred as the National Center for Toxicological Research. It's in Jefferson, Arkansas. It's a joint lab of the FDA and EPA.

Q. Is it a government-funded lab?

A. Yes, it is.

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Q. And what years were you there?
A. 1976 to early 1981.
Q. Was that a job?
A. Yes, it was. I worked for the medical center at the University of Arkansas on contract to the National Toxicology Labs. I was down there full-time and did some teaching at the University.
Q. How did you come to work at the toxicology labs?
A. As I said earlier, I have -- I've always had an interest in toxicology. I taught toxic plants course in veterinary school. Helped with toxicology courses at UAMS. So I went there to be able to do toxicology research.
Q. And what was your title there?
A. Staff pathologist originally and then senior staff pathologist later. I was manager of the histology labs as well.
Q. What is histology?
A. That's the discipline of taking tissue from animals in research or from patients in hospitals and studying them for change or diagnostic criteria. The histology part is how to fix those tissues so that they can be read by a pathologist.
Q. And when were you manager of the lab, the

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histology portion?
A. From probably '77 -- this is an estimate -- from '77 to late '78.
Q. And what happened in '78?
A. We hired a full-time histologist, so it freed me up for more of my research and testing responsibilities.
Q. And when you were at the Medical Center for the University of Arkansas, were you performing your functions for the lab at the medical center?
A. No, they were at the federal labs near Pine Bluff in a little town called Jefferson, probably 30 miles south of Little Rock.
Q. And what did you do at the University?
A. I helped teach courses in pathology and in immunopathology, and a course that was a hybrid of toxicology and pathology.
Q. What was that?
A. I forget the name of it. Toxicologic pathology, something like that. It was a graduate student course.
Q. Did any of your work up to 1981 relate to tobacco in any fashion?
A. No.
Q. Did any of it relate to nicotine?

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A. No.

Q. Did any of it relate to cancer?

A. Well, yes. A lot of the chemicals we studied at the National Tox Center were classic carcinogens.

Q. Such as?

A. Four aminobiphenyl. A compound called 2AAF acetylaminofluorene. We looked at synthetic estrogens like diethylstilbestrol. Some aromatic amines -- I forget which ones. There are quite a few of them. Those are the ones that come to mind.

Q. Were any of those chemicals in any particular process that your University or the national lab was interested in?

A. No, they were interested in studying the mechanisms of cancer. I did for -- on occasion help with pesticide work for the FDA, but those particular chemicals were known carcinogens not in commerce used to understand the mechanism of cancer.

Q. Did you, prior to 1981, study any compounds that you later found out were in cigarettes -- tobacco or cigarette smoke?

A. The only one that comes to mind is 4ABP. It has been reported in tobacco smoke in the literature -- four aminobiphenyl.

Q. 4ABP?

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A. Right.

Q. Did you publish prior to '81?

A. Yes.

Q. What type of articles?

A. I published articles out of Fort Detrick, which is where I was in the army, on infectious disease, Rocky Mountain spotted fever, Q fever, exotoxins of staph and strep. I did some publications on that.

And prior to that I was in nutrition at Natick Labs for a couple of years. I did some food chemistry publication, one or two. And then you said prior to '81 -- I had some articles at the National Tox Center. One on 2AAF -- two on 2AAF. After I left, the work I did was published on Rotenone, 4APB and a few other things.

Q. In the time frame of 1981, how would you as a -- is it fair to characterize you as a pathologist and not as a toxicologist?

A. Yeah. The way I refer to myself is I'm a toxicologist by experience, all the work I've done. I'm not a toxicologist by education. I am a pathologist by education and training. I am board-eligible in toxicology, but I don't see the need to take them.

Q. What is, in layman's terms, a

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pathologist?
A. It's someone who studies the process of disease.
Q. It does not have to be related to cancer per se?
A. It does not. It's a broad field, broader than that. The subspecialty, oncologic pathology is probably a cancer expert.
Q. Are you familiar with the concept, biological activity?
A. Yes.
Q. In 1980 or prior to 1980, was it a generally accepted practice in the pathological community to look at biological activities and try to draw relationships and conclusions to humans?
A. Yes. Biological activity was a term I was familiar with which could include changes that are not necessarily abnormal, but physiological adaptation and also include changes that would be considered abnormal. It's a broader term.
Q. And how would you examine biological activity in animals to make comparisons to humans?
A. Well, you can take a given infectious agent or a given compound or a given substance, expose it to animals by whatever would be the most proper route of

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exposure for a period of time, and then sacrifice or euthanize those animals and study the tissues. Or in some studies, you would take blood samples and you might not take tissues from the animals. It depends on the purpose of the study. There is a discipline called clinical pathology which would center more in the changes of the blood than it would tissue.

Q. And how would a scientist such as yourself draw conclusions from results obtained from animal studies, biological animal studies, and draw conclusions that somebody could relate to humans?

A. Well, it obviously depends on what you find in the given studies. You may find changes that are different than reported in humans or you may find changes that are identical or changes that are somewhat similar. And on that basis in your interpretation of your results, you would try to relate it in a discipline manner to what it might mean in human disease.

Q. For example, if you took 4ABA -- 4ABP you mentioned --

A. Uh-huh.

Q. Is there a way to inject that in an animal?

A. You can give 4ABP by a variety of routes. It's

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given orally because that compound was found to be in dye workers. Epidemiologically they saw an increased rate of urinary bladder tumors at some of the chemicals companies like DuPont and others, were concerned about that and got it out of their processes.

But the National Tox Center was interested in it. They wanted to understand the mechanism of bladder cancer. So they used that as one of several compounds to study how bladder cancer ensues in laboratory rodents.

Q. And put that orally, did you say?

A. Orally in the drinking water is one way. Diet is another. Depends on the compound and I believe 4ABP is in the drinking water.

Q. Well, what kind of conclusions can you draw if you orally injected 4ABP in a mouse? What kind of conclusions could you draw with respect to that insofar as humans are concerned?

A. Orally inject? Is that what you -- I don't understand. I need to understand the question. The injection can be into the check pouch of a rodent or a gavage is where you just put a blunt orifice instrument into the mouth and gavage. So oral as in the 4ABP case in the drinking water.

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Q. Say you get a mouse to drink 4ABP, okay?
A. Right.
Q. And tumors are caused as a result?
A. Yes.
Q. What kind of conclusions can you draw that's relevant to humans because 4ABP caused tumors in a mouse?
A. Well, if it's the same kind of tumor at the same site, then your interpretation could be more relevant to what may be going in those -- in the case of 4ABP was going on in those dye workers. And in fact, the same histologic change was present in the mice as was seen in the workers in the dye industry. That's why the compound was immediately removed from the commerce.
Q. As a pathologist, aren't you concerned that a mouse is a mouse and humans are humans so no conclusions can be drawn?
A. Well, there's certainly limitations. There's very definitely limitations and it's -- animal models and picking the right one is a difficult discipline. Some compounds the mouse is closer than even monkeys in case of the azo-dyes.
Q. Closer?
A. To the human's metabolic profiles. Metabolic

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profile is an important part of selecting an animal model. Other cases, the rat is closer. Depends on the compound.

Q. Is it --

A. And then there are times obviously that primates -- monkeys are closer.

Q. Does it depend on the compounds or the disease or both?

A. Both. In case of diseases, some animals are highly susceptible to measles virus, but not to yellow fever virus. Some animals are very susceptible to diplococcal pneumonia that people have and others totally can't get it.

Q. Is there a hallmark year or time period that you could point to that would say that at certain points in time in history it was pretty well accepted that you could draw corollaries between animal research and potential effects on humans?

A. Well, there are -- there are points in time where it began to be understood at different disciplines. For example, I think the research in diabetes melitis. I think there was research done on dogs back in the twenties. And showed that if you knocked out the beta cells of the islets in the pancreas, islets of Langerhans through some toxic

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agent or if you had a dog born without those islet cells, the disease they have is very similar to diabetes in people. That was probably, to use your term, a hallmark.

There have been a number of studies done in primates and other rodents where they have been able to duplicate the human infectious disease, and those were hallmarks. I think the discovery of measles in monkeys and how susceptible they were, I believe that was somewhere back in the fifties. I'm guessing, of course, but somewhere in that time frame.

Q. How about was there a hallmark for being able to draw conclusions with respect to lung cancer tests on animals and humans?

A. There is a compound -- I don't know when it occurred. My impression is it's in the early sixties, late sixties. Some compounds like DMBA. It's one of the anthracenes -- dimethyl something anthracene. I'm not a chemist. Can cause lung tumors in mice. I don't know if you'd call that a hallmark, but that was an example of a chemical carcinogen in an animal species. Now, DMBA is not considered or classified as a human carcinogen, but it's a suspected human carcinogen. Because it's a suspected human carcinogen, that work was considered

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important.

Q. Other than biological testing, what other tests were available to examine diseases such as lung cancer in the sixties?

A. Well, a lot of people at Oak Ridge and other places were using the approach that the American Health Foundation did -- skin painting. We use it as an industry. Because there was not a well-accepted, widely effective and reproducible animal model, some people used skin painting -- Oak Ridge did. They used it to look at diesel. They used it to look at creosote, asphalt, cigarette condensate, a whole host of things.

Q. Skin painting on animals?

A. On mice. Building on the American Health Foundation work before chemicals and -- and for tobacco condensate. But it's a surrogate. It's an extrapolation because the skin is not the lung.

Later the discipline of inhalation toxicology became more progressive. And there are four single compounds. They are a fairly widely accepted process of taking a single chemical and exposing it by inhalation. But in the earlier days, they had to use other kinds of approaches.

Q. When was the inhalation toxicology to the

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point where it was a well-accepted testing method?
A. Well, depends on who you talk to, but I think it caught up with, if not passed, many areas of toxicology in the late sixties and early seventies. That's when I think they became widely known as a good discipline in toxicology. I believe that's what you're asking.
Q. And up to 1981, had you utilized inhalation?
A. I did inhalation studies at Fort Detrick in the -- from '74 to '76 for infectious agents and/or in some cases, therapeutic antibiotic agents to look at treating disease. So I had some experience there. At the toxicology center, I helped design some inhalation studies. Helped look at some of the slides. I was not the primary pathologist on theirs. But after I left there and went to DuPont, I did a number of inhalation studies there.
Q. You left the toxicology center in '81?
A. Yes, early -- very early '81.
Q. Where did you go?
A. DuPont Labs in Newark, Deleware. At the Stine Haskell site, it's referred to.
Q. What's it referred to?
A. Stine Haskell Laboratories. They do

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agroscience, agrochemicals research there as well as toxicology, biochemistry, that kind of stuff. It's a multiple disciplinary site.

Q. What position did you apply for?

A. Senior pathologist. They -- I'm struggling with the exact terms, but later I became senior staff pathologist. It sounds peculiar, but senior staff was higher than senior.

Q. What years were you there?

A. '81 through '83, I believe. Early '83, two years.

Q. And how did you find that position?

A. My brother worked for DuPont and one of the human resources executives was fishing with him. And they said they needed board-certified pathologists really bad. And my brother said, "I've got a brother who's a board-certified pathologist, but I don't think you'll get him to move to Delaware." And the guy called me anyway and over a six or seven-month period of time talked me into an interview.

Q. What type of work did you do there?

A. I was a pathologist there. I helped with lab animal care some. I worked closely with toxicologists, helped design studies and conduct studies and interpret studies. I worked on

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pharmaceuticals. I worked on polymers. I worked on fibers. I did a lot of inhalation work there.

Q. Did you work on any chemicals that you later found out were in the tobacco smoke, tobacco or cigarettes?

A. I don't believe so. I'm trying to think. There were mainly anti-inflammatories -- nonsteroidal anti-inflammatory agents, what's -- telemers, which -- fluorinated polymers which are not in tobacco smoke and pesticides, which none of the ones I worked on are in tobacco or tobacco smoke.

Q. Wasn't nicotine used as a pesticide for a while?

A. Yes. DuPont didn't, to my knowledge, ever sell nicotine. Nicotine is used -- was used probably into the sixties for, of all things, a sheep wormer. Earlier it was used for flies, diluted samples on cattle and may have been used to worm cows as well as sheep. But when I was a high school student, we used nicotine sulfate to worm sheep.

Q. Well, do you know if it was ever used as an insect repellent?

A. I don't know about a repellent. Don't know. If it had -- it was used as an insecticide back in the early part of this century.

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Q. And did any of your work at DuPont relate to tobacco in any fashion?

A. No. No. The herbicides I worked on were used for corn and soybeans and rice. To my knowledge, I didn't work on anything there -- that is used in tobacco. If it was, I didn't know it.

Q. And what did you do in 1983?

A. Went to Rohm & Haus Laboratories, very early '83.

Q. Where are they located?

A. Spring House, Pennsylvania.

Q. How did you end up there?

A. They wanted badly a well-krown board-certified pathology and they heard about me and started calling me. And I had a good job at DuPont, but there was an opportunity to have more labs under me at Rohm & Haus, and they talked me into coming. So it was -- in one sense, a very clear entry into management and R&D for me.

(DEPOSITION INTERRUPTED.)

Q. Did you know anyone there?

A. No, I came to meet people like Wally Hayes, who I came down here with, during the interview process. They had a couple of pathologists there that I had heard about, but I had not met them until I

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interviewed.

Wait, wait -- there was a pathologist and is a pathologist who does consulting for them that occasionally worked for them on a temporary basis named Ray Brown. I had met him at the National Tox Center. We worked on a National Academy of Science project together. But he was not an employee of Rohm & Haus. He was a consultant.

Q. Up to '83, were you a member of any societies or organizations related to your work?

A. Well, I belonged to the AVMA, American Veterinary Medical Association. I belonged to the ACVP that I've mentioned before. They also have an association.

I had a -- I was a member of an institutional membership in lab animal medicine and -- wasn't an individual member, but you can be a designee from the institution. And the Society of Toxicologic Pathologists, had an institutional membership with them. They used to be called SOPEP, the Society of Pharmaceutical and Experimental Pathologists. They changed their name in the early eighties to SOTP, Society of Toxicologic Pathologists.

Q. And what was your first position at Rohm & Haus?

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A. I was head of pathology as well as the histology labs once again and lab animal medicine. I had these three areas and pathology included clinical pathology. So the pathology part had two branches to it.

Q. How was clinical pathology different than just pathology?

A. That gets back to what we talked about earlier, the discipline of chemical pathology studies blood and urine. Can be sputum, saliva. Chemical changes and cellular changes. That's the essence of clinical chemistry and clinical hematology and cytology.

Q. How long were you in that position?

A. Not quite two years, just short of two years. Like 20 months somewhere thereabouts.

Q. And what was Wallace Hayes' position when you went there?

A. He was director of toxicology.

Q. Between '83 and '85, did you do any lab work, pathology work or the like for tobacco companies?

A. I left -- I came here in '84, October of '84. So the almost two years was all of '83 and part of '84. So I came here very late '84. No, I did not. Rohm & Haus has a pesticide -- Mancozeb, I believe

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it's called. I didn't do any work on it. It has been used by tobacco farmers for blue mold. It's the closest thing to any tobacco work I did there.

And I didn't do that work. I collaborated with others on some of the issues around that. Regulatory issues. You have to provide certain data to EPA and USDA to keep it certified as a fungicidal agent.

Q. And you began Reynolds in October of '84?

A. That's right. My first day at work was October 4th.

Q. Did Mr. Hayes come with you?

A. He preceded me. He came here in July.

Q. How was it that you both came to Reynolds about the same time?

A. When he came by to tell me where he was going when he left Rohm & Haus, I just mentioned in passing that I envied him. Because not many opportunities to build a toxicology laboratory and animal research laboratory from the ground up. They're -- still are -- very rare, new ones are. And I just mentioned in passing I thought he'd enjoy that opportunity. Well, he called me after he got here and asked me if I could consider being a part of it because they need a pathologist here and they need a good manager scientist, to use his words, and they wanted to build

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an animal research facility.

Q. And it was your understanding that Hayes was coming to Reynolds to build a toxicology department or an animal research laboratory?

A. Both. Both.

Q. And your understanding is none existed in October of '84 -- July of '84?

A. Well, there were some scientists here doing toxicology, Chin Lee and others. They had limited animal facilities down in the first floor, west wing, self-contained facilities and they did some work contract outside.

Q. But Hayes was to, what, develop an independent and standalone toxicology animal lab research department within Reynolds?

A. That was part of it. He had a number of things that were goals or expectations, objectives. And those were certainly part of it.

Q. Do you know what the purpose of this toxicology animal lab was to be?

A. It was to be product research and testing. Trying to understand the biological activity and toxicity of tobacco smoke as you mentioned earlier, and to develop a more in-depth process for comparing different cigarettes or ingredients or processes.

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To put it to a bottom line, we decided to build this group as if it were regulated by FDA, EPA and do testing along those lines. And one of our earliest premises was comparative toxicology. You had to compare ingredients to each other or cigarettes to each other if there were new kinds of cigarettes or new ingredients in cigarettes.

Q. And you were part of that?

A. Yes.

Q. How was that accomplished before you and Mr. Hayes arrived?

A. Well, we had what's referred to -- Reynolds had what's referred to as in vitro toxicology group. Means cell cultures, the Ames Lab, sister chromatid exchange, chromosome aberration, those kind of tests. And they were done by Dr. Chin Lee and I think about four technicians and technologists that worked with him, I believe is what he had when I arrived.

They had a scientific affairs group. I don't -- it seemed like to me there were about six people, but I don't recall the exact number. And they -- they would keep up the literature and keep up with the issues out there in the literature and if need be, contract work at a contract lab.

Q. What lab was that?

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A. I know they had done some work with A. D. Little in Massachusetts. I believe they had done some work out in the Midwest, around Chicago. I don't know what the name of that lab was.

Q. Baettele?

A. Baettele, I believe, in Ohio had done some work for Reynolds. I'm not certain of that. We certainly have used Baettele in Richland, Washington as well as Ohio.

Q. When you began in October of 1984, what facilities did Reynolds have in-house for testing diseases related to smoking?

A. Well, the facilities I referred to earlier is what they had on toxicology. Some of the work that's done could be considered indirectly smoking and health kind of work, if that's the term. They were -- when I arrived, they weren't heavily engaged in basic smoking and health research.

Q. Was there any group at Reynolds in October of '84 that had as its only goal looking at health and diseases related to smoking?

A. Prior to '84?

Q. Yes.

A. I don't know the answer to that. I'm sorry to say I'm not much of a historian. I didn't spend much

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time trying to, you know, find out the history of the science here at Reynolds.

Q. Did you look and see what prior research had been done on smoking and health?

A. I -- Dr. Sam Simmons arrived two months after I did and he described to me work that had been done, testing that had been done. I don't -- again, the "smoking and health" phrase is problematic because it's -- in my judgment, it was comparative toxicology, comparative research.

The word "basic" was primarily -- we had funded, as I understood it, work at places like Duke and UNC and other places that were more basic as well as what the company did through CTR. So our purpose for being here was to wrap up the product development and product research as opposed to the basic smoking and health research. But obviously we used some of the same techniques and assays.

Q. And you're still employed at Reynolds?

A. Yes, I am.

Q. What did you do to prepare for this deposition today?

A. I had a few sessions with internal counsel just to become acquainted with the process. I've not been in a deposition before.

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Q. How many sessions?
A. Six, I believe it was.
Q. How long?
A. Well, they varied from one to three hours.
Q. How many different attorneys?
A. Let's see, one in-house and I guess three from Jones Day and one from Womble Carlyle.
Q. Did you review any documents?
A. No. No, I -- I brought some of my presentations just to show our counsel some of the work I've done.
Q. What --
A. But we didn't review them.
Q. What kind of presentations?
A. Oh, I've done a number of them. We were talking about biological activity earlier. I've done things on biological activity and toxicity and the terms themselves and presentation SOT. I've done them on modification -- product modification to lower biological activity. As a presentation, I showed them. I did a review of the literature that I presented to upper management that I brought and let them see. We didn't discuss them or review them, though.
Q. When did you do that review?

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A. Oh, let's see -- 1989. We had a new management in New York and I made a presentation for them and that was the presentation. Testing we had done to modify products and other people had done. And literature citations on what tobacco companies ought to do with cigarettes. That's one of the main, if not the main, emphasis of the group that I came here to join and help build.

Q. Did you look at the document request that was provided with notice of deposition for today?

A. No, I haven't looked at it.

MR. MAISTROS: Let me mark this.

MS. KNISELY: Actually if we could mark the entire thing. It is -- includes a July 10, '97 correspondence to Mark Belasic, counsel for Reynolds, including the deposition notice which includes the production of document request and the transmittal sheet, because the deposition notice was sent via fax. The transmittal sheet confirming that it was received by --

MR. MAISTROS: Let me just have it.

MS. KNISELY: -- Jones Day on July 10 of 1997.

(PLAINTIFF'S EXHIBIT 1 MARKED FOR IDENTIFICATION.)

MR. BELASIC: Let me put a statement on

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the record. It does appear that fax sheet was sent to me at my offices. It was also attached to an interrogatory regarding a Michael Shannon. I do remember receiving the interrogatory and responded in writing to the interrogatory. I have to admit I don't remember receiving the document request for Gary Burger.

Nonetheless, I have a position on the document request. And first, that document discovery in this case ended on May 30. And whether it's attached to a depo notice or whether it's a document request, it's untimely and it's contrary to the Court's scheduling order.

Secondly, the document request is not limited in any way. The document request asks for every document or piece of paper in Dr. Burger's possession that relates to Reynolds, which I presume includes most every piece of paper in his office. Now, I mean, we'll agree to work with counsel, but the document request is going to have to be limited. First, because Reynolds doesn't have any obligation nor does Dr. Burger to produce any documents. But secondly, he's certainly not going to bring his entire office in here. So if you want to talk about the presentations that he's made or papers that he's

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written that are available to him, we'll work with you.

MR. MAISTROS: We will -- we will -- we'll explore the universe of documents that's relevant during the course of the deposition and reach a conclusion or some consensus on this in a reasonable fashion later.

MR. BELASIC: Fair enough.

BY MR. MAISTROS:

Q. What position did you apply for and obtain when you started at Reynolds?

A. They interviewed me for director of toxicology and then offered the position a couple of weeks later, and I accepted.

Q. Who interviewed you?

A. Well, most of the directors in R & D, the ones that were here. You want their names?

Q. Let me ask you this first. Was there a director of toxicology?

A. No. No, the term -- there was a director of biochemical biobehavior. That was Wally Hayes. Prior to him, there was someone -- I don't know who -- that had a similar title. And it might have been scientific affairs director for scientific affairs. I don't know --

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Q. Now --
A. -- what the exact title was of the person preceding Wally.
Q. Was Wallace Hayes on a level -- same level with you when you started?
A. No, he was a more senior director. I don't know how many levels of director there were when I came, but I was the first level and Wally was either second or third if there were two or three. Whatever there was, he was the highest level.
Q. You were under research and development?
A. Yes.
Q. Hayes was under research and --
A. That's correct. He reported to Dr. Bob DiMarco, director of R & D.
Q. And Hayes was in charge of biochemical?
A. Biochemical biobehavior, I believe is what it was called. And toxicology was part of that.
Q. So toxicology was under that?
A. That's correct.
Q. So it was DiMarco, Hayes --
A. Me.
Q. -- you?
A. In that functional area. That was the hierarchy.

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Q. How many other groups or divisions were there under R & D in '84?

A. Let's see, I don't remember the exact names of them. There was brands. There was, I believe, a group called chemistry. There was process technology and development. There was administrative and executive, which included building maintenance and a lot of other things. There was -- I believe it was called biochemical research or chemical research. Seems to me there were --

Q. Was there a new product --

A. -- seven or eight direct reports to Bob DiMarco, maybe more.

Q. Was there new products?

A. Yeah, but -- there certainly was, but I can't remember what it was called. New product development maybe? I don't know.

Q. Who was in charge of chemistry in '84?

A. I think Alan Rodgman. And I think the new product area might have been Don Piehl, but I don't remember. It was hard to sort them out during that interview.

Q. Who was brands?

A. Brands in '84 I believe was Bobby Harden.

Q. Process technology?

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A. Dan Pugh at that time was head of that.

Q. And biochemical?

A. Chemical research was Alan Rodgman. The other -- applied chemistry. Now, it's coming back to me. Chemical research was Alan Rodgman. Applied chemistry was Don Piehl.

At that particular time, I don't recall who had new product development. They did have an area that Premier was in at that time, development of it. And that was headed by Bob Lloyd, but I don't remember what they called it. And what we refer to today as new product development was in that area and it was headed by Bob Lloyd, but I'm sorry. I don't remember the name of the group.

Q. Okay. As director of toxicology, how many people were you assigned?

A. Well, I had seven or eight when I arrived and somewhere in the vicinity of 18 head count to recruit and build up the group.

Q. The seven or eight that you had would include Lee?

A. Yes.

Q. And any other -- he was a doctor, was he not, of toxicology?

A. He was -- his Ph.D. was in microbiology and he

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had a specialty in toxins and microbiology. I mean he had a toxicology background, but his work experience was in assays for biological activity and toxicology. He had the Ames Lab and others labs.

Q. What's the Ames Lab?

A. Well, it's -- it really should be referred to as genotoxicity or genotoxicology. But the Ames test is a test for mutagenicity in bacterial cells, Salmonella strains.

Q. And what is mutagenicity?

A. Any time you can get a mutation in genetic makeup of a cell and you can detect that chemically or biologically, that's called a mutation. And that's what the lab looks at are mutations. And his group also were looking at chromosome changes. And they primarily tested ingredients and flavors as well as whole smoke and smoke condensate from cigarettes.

Q. Was there anyone at a level comparable to him that you inherited?

A. No.

Q. Were the other six to seven people lab technician type people?

A. Technicians and technologists. My duty was to recruit a new group of people and to expand that capacity in-house.

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Q. Were you --
A. They decided they wanted to do it in-house.
Q. Were you given a budget?
A. Yes and no. "You tell us how much it's going to cost." So I would go figure it out and tell them, and they would approve it. So I don't know if you'd call that it a budget or not.
Q. Where were you located?
THE WITNESS: That clip is just -- either my tie is too slick.
A. When I originally got here, I was located on the third floor of the west wing of the tox -- of the R & D building. I later went to what's called Building 9, and that was our interim facilities for about two years while we were waiting on the new toxicology building to be completed.
Q. Were you hired -- was Nabisco in the picture in '84?
A. No, I don't remember the exact year, but I -- it was a couple of years later -- '86 or '87 when the acquisition of Nabisco began to occur. I mean it was in the newspapers long before it was consummated. But that was a couple years later. Del Monte was part of us, Heublein, Kentucky Fried Chicken, bunch of stuff like that. I can't remember all the company

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names.

Q. Who was your -- did you have a contract in '84?

A. Did I have a contract?

Q. Written contract?

A. Yeah, of sorts. Much like any other company that I ever went to work for -- DuPont or Rohm & Haus. It was a standard contract.

Q. Who was the other party to it other than you?

A. Well, the company, Reynolds.

Q. Was it Reynolds Industry? Reynolds Tobacco?

A. Reynolds Tobacco. Yeah, I didn't understand your question. Yeah, it was Reynolds Tobacco.

Q. Was it for a specific term?

A. You mean --

Q. Length of time?

A. No. No.

Q. Did it have a monetary component to it?

A. The contract didn't. We had negotiated my salary. But I don't -- it wasn't part of the contract, I don't believe.

Q. And was the contract a noncompete?

A. It had a noncompete clause in it.

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Q. How many people did you hire for that department or recruit?

A. These are approximate numbers. I'm not a very good historian, so bear with me. We probably in the next year and a half recruited 20, 30 people and in years later continued to add people to staff.

Q. What was the written or unwritten stated goal or mission of this new department?

A. Well, in essence, the role was to study and test our products to meet consumer wants. And to, when appropriate, do basic research to understand the product itself and any criticisms that are brought forward about the product or its design. And to test products that respond to those issues. That's the nuts and bolts of it.

Q. Was there a written document that would reflect that?

A. There probably is in our -- I mean, we had mission statements and those are in the files.

Q. Would those still be in your files?

A. They would probably be in the archives center, the ones that go back to the eighties. We have a general -- the company has a general archive because our office areas and lab areas, we don't wanted to burden them down with files. So we have a central

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depository of files.

Q. When you say that you tested the products, would that involve the end product or the components that went into it or both?

A. Both. Both. It's a case-by-case thing. You -- if it's an ingredient you've used before but you changed the level of it, you'll do a certain kind of testing. If it's a whole new design of cigarette like Premier or Eclipse, you do more. Depends on -- and if it's an ingredient that's never been used before, you test it extensively. If it's an ingredient that's been used before, you test it but less extensively.

Q. Did you go back and look at the history of testing at Reynolds to determine what ingredients had been tested at Reynolds?

A. I didn't. Bob Suber did. He's the director of scientific affairs. We occasionally -- he would occasionally tell me things that had been done. For example, the array of tests on expanded tobacco -- what had been done in the past. And he kept that process going, but he added some tests to it. I remember discussion around that.

Q. Is scientific affairs a separate unit or does it overlap?

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A. It was from toxicology. They're part of R & D. And health environmental services is the name of the functional group and a division under scientific affairs.

Q. Was that group in existence when you began?

A. Yes, it was.

Q. And who headed it?

A. I don't -- I think Charlie Nystrom had it when we first came, but they expanded the group and put it under Bob Suber. And then Charlie was part of that group.

Now, he may have been acting head. I don't know what the history of it was. He had a similar position to Bob's. When Bob came, Bob took it over and Charlie happily went to a more focused area. And he didn't like having the group and worrying with management and that sort of thing, as he told me.

Q. How did scientific affairs or health environmental services differ from what toxicology was doing?

A. Well, we were a laboratory function primarily, both what we did in-house and getting involved with the contracts on testing out of house. Bob Suber, scientific affairs group, had several functional --

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and still do -- areas. The government regulations, the archives or scientific literature that's published that we try to keep abreast of, and product stewardship. Changes in product have to be approved through his group. He is our -- he and his staff are our experts on ingredients, for example.

Q. Didn't toxicology test ingredients?

A. Pardon me?

Q. Didn't toxicology test ingredients?

A. Yes, but we did it -- we, being me and my staff and Bob and his would always make joint decisions on what testing should be done. So the product stewardship part wasn't the laboratory testing and laboratory research. It was the policy.

Product developers had to get approval from Bob's group before they even would look in a chemistry lab at an ingredient or change. But if they were looking at one and they had interest in it, we needed to test it or research it, my group would do that.

Q. Okay. You have never had your deposition taken before?

A. No.

Q. Have you ever testified before in court?

A. No.

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Q. Have you ever testified before any governmental agencies?

A. When I was at Rohm & Haus, I had meetings with EPA officials. When I was at NCTR, had meetings with FDA officials. But those were scientific interchanges. They were not under oath or in a set up like this.

Q. You never testified at FDA, FTC after you started at Reynolds?

A. No, I've met with FTC scientists and lawyers to answer questions like about Premier.

Q. FTC or FDA?

A. FTC. We've interacted with FDA scientists at different meetings, but I have not gone to FDA. Now, when I was at the National Tox Center, I was on contract with the FDA and interacted with them frequently.

Q. Did you ever submit any written documentation to the FTC or the FDA since you've been at Reynolds?

A. When we -- when we came out with Eclipse and with Premier, we put some documents together. But I don't know who -- I think Bob DiMarco, for example, had some interaction with the FDA when Commissioner Young was there. And we gave him some documents and

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I helped compile that.

And then we -- we've had since '94 a couple of occasions where they asked for documents. And my -- my people and I helped get together the documents they asked for. But I -- me directly submitting documents to FDA, no. I was part of a process of responding to an FDA request.

Q. And since 1994, what occasions has the FDA requested documents from toxicology?

A. Well, they requested how -- what we do in process and any nicotine issues there. We put together some documents for them. They requested some information on Eclipse and we gave it to them. Those are two that come to mind.

Q. Who had final authority over which documents were submitted to the FDA with respect to the nicotine issues?

A. The director of R & D at that time who had been Carl Ehmann in conjunction with our government regulations group under Tommy Griscom. So R & D and them, we'd get advice from counsel with regulatory expertise. But those two groups were the primary deciders, to answer your question.

Q. But the documents they obtained from toxicology, who had authority on what was given to

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those people to subsequently give to the FDA?

A. It was shared authority -- Bob Suber and myself.

Q. Did you keep a record or file on what documents you gave to Ehmann or Griscom?

A. They would be in my general files, but that would only be my portion of it. I don't know -- someone has, but I don't know exactly who it is -- would have the whole package sent to FDA.

Q. Separate and apart from the whole package that was sent to the FDA, is there a separate file or record of what you gave Ehmann and Griscom that you thought was relevant to the FDA's request?

A. There probably is. I know there is, but I don't know what it would be filed under. So there is such memos, but I don't know how they would have filed them.

Q. What type of documents did you give to Ehmann and Griscom with respect to the nicotine issues?

A. Well, I had folks that worked for me that were experts in smoke composition and ingredients along with who Bob Suber had. So we put together answers to the questions that FDA would have. So I would instruct folks in my area -- Tom Perfetti, Dave

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Townsend -- and on the process side, Watt Dufour -- to put together the documents for answering any questions. And I believe Mark may know better than I -- that Rich Cooper, the consultant for this company would be the -- where all the documents would come to after Ehmann and Griscom and others looked them over to deliver to the FDA.

Q. And who was Mr. Cooper with?

A. I don't know the name of his law firm. Rich Cooper. I don't know the name of his firm.

Q. Oh, he's a lawyer?

A. Yeah.

Q. Did the FDA ask you, for example, of any research you had done on nicotine addiction?

A. I believe they did. Asked for that category, but that would have been handled -- that kind of request would have been handled by Don deBethizy's group, Dr. John Robinson, those area -- those guys. Wouldn't have been handled by me.

Q. Did he ask you for any research that you had done on potential health issues related to ingredients?

A. That would have been asked of -- at that time, that would have been asked of Bob Suber. And I had a historical perspective, but that request would have

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gone to Bob Suber and Don deBethizy. They had the test lab -- Don had the test labs.

I had inhalation toxicology still reporting to me. So anything that qualified under ingredients, Dr. Suber already had because our labs give him the reports that we do. But there was some involvement of Dr. Mosberg, who's head of animal testing, in getting those documents together.

(MR. MAISTROS AND MS. KNISELY CONFER OFF THE RECORD.)

Q. When you submitted the -- did the FDA ask questions that had to be answered in written form?

A. Yes, the ones I'm familiar with -- there's, "Do you at any time in your processing add nicotine? What do you do to control nicotine? Where do you measure nicotine in the process?" That series of questions.

Q. Who had primary responsibility at Reynolds for answering those questions?

A. Well, when the request came in, it was '94. And two people working for me, Dave Townsend and Tom Perfetti, I assigned that responsibility to. And they worked with people in PT&D, which is process, technology and development. And Watt Dufour was one of the guys that were involved in that and I forget who else. Some of the engineers that work in the

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respective facilities that could help answer the questions.

Q. Did you participate at all in drafting answers to those questions?

A. No, I -- I looked at the answers to make sure that from my perspective nothing had been left out. I was not the author of such responses.

Q. Who was the primary author?

A. Well, depending on what aspect, but I think Perfetti and Townsend were the primary authors I would suspect on those questions that I just answered. I know they wrote some of the documents and met with the investigators when they came down from the FDA and from the justice department.

Q. Did Reynolds' legal counsel participate in drafting answers to the FDA request with respect to nicotine?

A. They were aware of them and looked them over because they were involved in the negotiations with FDA counsel on what documents could -- you know, that we'd give them and they were the conduit for the questions. It was FDA legal group to our legal group, scientific questions to scientists. That was the process.

Q. Were you aware that in April of 1994,

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Reynolds' CEO, Johnston and other CEOs of other tobacco companies testified before Congress with respect to nicotine?

A. Yes, I was. I watched it as well.

Q. Did you participate at all in preparation of Johnston's speech or written statement to Congress?

A. I participated -- I put together voluntarily -- no one asked me to -- questions I anticipated Mr. Johnston would get and said what I would do to answer them. I did not write his response or his answers.

Q. The questicns that you put together that you anticipated and the answers that you put together, do you still have a copy of that?

A. I don't know. I should have, but I don't recall whether I kept a copy of -- the folks that were working with Mr. Johnston, I gave a copy to one of them. I don't know if I kept a copy. I probably did, but I don't remember.

MR. MAISTROS: I'd ask -- we can debate whether it's going to be produced later. I'd ask that that be one put on a separate list to be brought tomorrow if you can find it between today and tomorrow.

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THE WITNESS: I won't have time to find it. I'll be here all day with you and I've got an appointment tonight.

MR. MAISTROS: I'll let you call your office at lunch.

THE WITNESS: Well --

Q. The -- who put together --

MR. BELASIC: Well, we'll debate it later.

Q. Who put together the -- or who worked with Johnston on his speech and written statements?

A. He didn't give a speech. Who worked with him on his statements and answers -- Bob Suber, Dave Townsend, Chuck Blixt -- that's the ones I know about. I don't know who else was involved.

Q. Who is Blixt?

A. Blixt was at that time R & D legal. So we tried to help with the technical questions.

Q. In the material that was provided to the FDA and your anticipated questions and answers that were provided to Johnston, did you disclose to the FDA and Johnston if nicotine was added to the product?

A. No, because it wasn't.

Q. What is that testimony based upon?

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A. Well, since I had product development and assessment, the people that had the R & D portions of the specs and the R & D portions of the process worked for me -- many of them did. And I was familiar with what we do in processing and I knew we didn't add it.

Q. Did you take it out?

A. There's some taken out in what's called a reconstituted sheet process. You take tobacco -- and what's called tobacco scrap. And you bathe it in water to make a sheet, like a paper process out of it. And you lose probably 30 percent of alkaloids including nicotine in that process.

Q. Did you put that nicotine back?

A. Nope. There is more -- there is enough there. You don't need to pick it back.

Q. So the nicotine that is extracted during the reconstituted tobacco process, it's your understanding none of that is put back in?

A. No, it's a dynamic process and the water, it recycles and re-bathes. So you could -- it's theoretically possible that some leaves and come backs and leaves again. But at the end of the process, you've lost about 30 percent of it. It's a recycling bath process. And anything that's water

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soluble, much of it is going to leave.

Q. And nowhere in the process is nicotine or water containing nicotine intentionally put back into the tobacco?

A. Not that I'm aware of. What you end up with in product is based on the tobacco that's used to blend that product. What's naturally there and whatever's lost through the process. Because there's parts of the process that see heat and that'll -- all volatiles come off then including nicotine. There's parts of the process that see water. Nicotine is water soluble to a degree. And anything that's water soluble, you'll lose some of it.

So you have a process where you know the approximate level of alkaloids going in and solids and what you will lose in the process and you can predict what comes out. We don't do much measuring in between, if any.

Q. So I assume your testimony would be that you don't control the nicotine levels in the cigarettes?

A. We try to control the blend and whatever comes with that is where you're going to net out with your nicotine.

Q. Do you control the nicotine in the

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process?

A. Pardon me?

Q. Do you control the nicotine in the process?

A. Not per se. Any control of nicotine would be secondary to the blends in the process of the leaf.

Q. So there is no effort at Reynolds to control nicotine throughout the process?

A. No, the only concerns we have is in each tar category, nicotine should be in a certain range or the product will be distasteful to smokers or too bland, one or the other? If you end up using leaf that's too high in nicotine, you're going to have a product that that particular consumer group doesn't like because it's too harsh. If you end up with nicotine and other water solubles and volatiles too low, smokers are going to say it's too bland and it doesn't taste good enough.

So we have an understanding of a basic window, if you will, per each tar category that we are apt to have a good tasting or bad tasting cigarette. But we drive everything on that design of product by blends and the air ventilation and filters and that sort of thing.

Q. Do you try to control the tar levels in

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the cigarettes?

A. To a degree, yes, we sure do.

Q. More so than the nicotine?

MR. BELASIC: Object to the question. It misstates his testimony.

MR. MAISTROS: Well, he didn't testify to this yet. Well, I guess he did. He said he didn't control the nicotine.

MR. BELASIC: Well, I disagree. He can answer the question.

THE WITNESS: What is the question again?

Q. I'm not implying that you control the nicotine because you've already testified you don't.

A. Right.

Q. But do you try to control the tar?

A. Yes. And I said yes.

Q. And to the extent that indirectly you control the nicotine, do you control the tar more than the nicotine?

A. Yes.

Q. But you're not accepting my proposition that you control the nicotine, though?

A. That's correct. You get what you get. It's all depending on the leaf you start out with, the level and what's lost during the process. So we do

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things in terms of what kind of leaf we use, what kind of ventilation, what kind of paper to get a certain tar level. We can predict, but not with great precision, where the nicotine will be when you do that. And it can vary 20 to 25 percent I'm told much of the time.

Q. So it's the leaf, the ventilation and the paper that has the ultimate end product effect on the nicotine?

A. Yes, and the type of processed leaf, the type of processed tobacco. Not only the type of leaf you start with, but also the kind of process. The kind of reconstituted sheet we use, the expanded tobacco or whatever. All in all, what you do -- what tobacco you start with and what you do to it is where -- and the paper you use on it and the filter and the ventilation of the filter, those are the mechanisms for controlling what tar level you'll get.

Q. What's that got to do with nicotine?

A. Nicotine tends to follow tar. Not -- not perfectly, but in a trend, it follows tar. The reason for that, you can have a range in the type of leaf you use and even within the type of leaf, like burley or flue-cured -- tobacco, that come the early part of the tobacco year might be lower in nicotine

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and that that comes at the end of the crop year might be higher.

If the year is dry, limited rainfall, the tobacco you get may be smaller, but higher in nicotine and higher in other alkaloids. Certain kinds of fertilizer might add to things like nitrates in the tobacco and could affect nicotine. That's the theory. I don't know how valid it is, but that is a theory.

All of these things are going to end up dictating what leaf when you buy it has as to a range of nicotine and the three major types that you use -- Turkish, flue-cured and burley. So depending on the climate of that year and the agricultural practices, you'll have a range of nicotine in each leaf.

We measure when we buy tobacco, things like wet TPM, and nicotine and sugars and what have you in a process of random sampling where you try to get a prediction. You know what it is when you bought it. You know what you probably lose when it ages, when you store it. And periodically you measure the end feed. And then when the cigarette is made, you periodically measure because we need it for FTC services -- purposes for tar and nicotine.

Q. How many different brands does Reynolds

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have?

A. Well, in full price brands, we've got Winston, Camel, Salem, Vantage, Now. We have probably four or five brands in a small marketing effort called moonlight and they are full-priced brands, but probably four brands there. And then in savings segment, we have Dural and a number of savings segment brands, but I don't know how many.

Q. And in the Winston, Camel, Salem, Vantage brands aren't there various products within those brands?

A. Yeah, there are different -- we call them brand styles within each brand family.

Q. And isn't it fair to say that each of those different brands styles have different tar and nicotine ratios?

A. That's a fair statement. They have different tar levels. You said ratios? Nicotine tar ratios? Let me ask you --

Q. Well, do they have different tar levels?

A. Yes.

Q. Do they have different nicotine levels?

A. Yes, there is a range. Nicotine will go with that tar, as I stated earlier.

Q. Okay.

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A. They do not have different -- to my knowledge, very different ratios of nicotine to tar.

Q. And aren't the tar levels and nicotine levels of each of those different products known before the cigarette is manufactured?

A. We have what's called -- when we develop a brand, we have specs that we shoot for. So we do have knowledge at the end of that product development process. We know what the product is that we're recommending that manufacturing has as to a range of nicotine and range of tar.

Q. And those specs are developed before the first tobacco leaf gets to the factory, are they not?

A. The specs are developed using the same tobacco in the pilot plant at R & D.

Q. Okay.

A. So you're using the same tobacco they use in the manufacturing plant, the same papers, the same filter in R & D to develop those values. What are they going to be under these specs?

Q. All right.

A. We don't target the nicotine level. We do target a range of tar. We find out what the nicotine level is with those blends and those specifications.

Q. Your specifications don't have specific

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target levels for nicotine?

A. No, they -- they often have a range of expected nicotine in them. Because as I stated earlier, if we find in the development process that our nicotine is too high for that tar level or too low, we screwed up. We messed up somewhere because we know it's not going to taste good. So it's just a rule of thumb. You've got a window you need to be in or you're apt to have a bad tasting cigarette.

Q. Okay. And it's your testimony here today that the only consideration given to outside influences on nicotine levels is tar, ventilation, type of leaf, what? There are no chemicals used in the process at all that play any role with respect to nicotine?

A. There's no ingredients added for that reason.

Q. No ingredients are used by Reynolds -- and we're talking about from '84 to the present, right?

A. That's how long I've been here.

Q. No ingredients are used by Reynolds that have as one of their purposes or effects of affecting the nicotine yield of their cigarettes?

A. No, we had a test project that Dr. Kessler asked about in those testimonies that you referred to

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earlier. Public health officials in Europe have been publishing for some time and some in the United States like Gio Gori that companies ought to develop cigarettes that have maintained nicotine and low tar.

So we had a project where we tried to yield a product that had less than a ten-to-one tar to nicotine ratio because that was what they advised. And that's in the Froggatt Committee report, the Hunter Committee report, publications by Mike Russell, publications by scientists at the University of Munich and Germany and other places.

It's pretty evident in the literature that the European public health community believes that you shouldn't take nicotine down too far in cigarettes. They believe, based on what they've told me -- I've interacted with them -- they believe that our ultra low tar cigarettes in this country, including Premier and Eclipse, are too low in nicotine. They would be better if they were higher nicotine, to use their words.

So you can use -- the leaf you use and the blends you use can be higher nicotine, as I stated earlier. But if you make them higher in nicotine per tar level when the blend comes out, it's going to be too harsh -- too harsh a cigarette. Be too high in

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alkaloids, too high in pH. It'd be like cigars or pipes.

So we looked at some natural ingredients of tobacco leaf and some flavors that have been used in the industry to see if we could develop a cigarette with a tar to nicotine ratio of less than ten-to-one. And the one we worked with the most was levulinic acid which is in flue-cured tobacco.

Q. Now, so I'm clear on this, it's your testimony -- and tell me if this is unfair -- that the only efforts Reynolds employs to, quote, "control nicotine," unquote, is to pick the right blend of either natural leaf or processed tobacco?

A. To the best of my knowledge. I'm sitting here thinking I don't know of any other thing that we look at other than blending -- blends of the tobacco, filter and paper technology with those blends that would impact nicotine delivery.

Q. Let me --

A. Tar is what we go after and we have a predicted range of nicotine that will result from that.

Q. Well --

A. And as I stated, we have experimented with how would you turn that -- change that ratio since that's what scientists and public health officials have said

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we should do.

Q. Now, when you use the word "nicotine" delivery, I think you used, what do you mean by that?

A. I used "yield."

Q. Yield?

A. Is what I used.

Q. You mean by yield under the FTC test method?

A. Sure.

Q. Would you distinguish --

A. Again, you've got to understand, because it's complicated, that we do -- we search the literature a lot. And some -- in the recent last three years, some scientists like the American Health Foundation, like Dr. John Slate and others think we ought to use a different methodology than FTC.

So we do on occasion some different puff profile than FTC because they're going to ask for it. Whenever we publish something or report something, they're going to ask for what is it at 50/30 -- 50 milliliter puff, 30-second interval, two seconds. They're going to ask you.

So if we anticipate we've got something different or unusual that we're trying to do to respond to our critics, we know they're going to ask

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us for that data and we occasionally run it to be able to give them the answer that they ask for. But most of our work is FTC.

Q. When you said that -- talking about yields, you're talking about some method of testing the nicotine that comes out of the smoke as opposed to what actually passes through the human body?

A. Yes, it's a smoke yield as I said. The only thing that you can measure in people is blood levels and urinary levels of either nicotine or cotinine. That wouldn't be a good standard test for where you came out with your blends and your specs. People wouldn't want you punching needles in them that often.

Q. And it's your testimony that you cannot think of any chemicals that have the intended or effect of controlling nicotine in the tobacco process?

A. None that I know of. Now, we have product developers and product scientists that certainly have more details than I do, but to my knowledge, no.

Q. The tests that you just talked about -- blood levels, urinary level test. Are you aware of any research that's been done at Reynolds to determine how nicotine passes through the human

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blood?

A. No, we have done on occasion for Premier, for Eclipse, for a product that we have in Oklahoma called Winston Select, Special Select. We have done nicotine levels because we know that the scientific community is going to ask for them. When we have done those tests, we -- we will compare them with commercial cigarettes like the leading cigarette in a category or a reference cigarette, one of the Kentucky reference cigarettes, one or both as a point of reference.

MR. BELASIC: Good time for a break, Jack?

MR. MAISTROS: Sure.

THE VIDEOGRAPHER: We're going off the record at 10:50 a.m..

(RECESS TAKEN FROM 10:50 A.M. TO 11:02 A.M.)

THE VIDEOGRAPHER: We're going back on the record at 11:02 a.m..

BY MR. MAISTROS:

Q. Other than the document you helped prepare for the FDA request and the questions and answers that you did on your own for Johnston, do you have any recollection of submitting any other documents or preparing any other documents for

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submission to any other governmental agencies?
A. We had at sometime in early '94 -- I believe it was right after the first half of '94, I believe it was after the Waxman hearings that we referred to earlier -- there was a request by FDA for all work that we had done biologically or chemically on nicotine. And so I helped get those documents together, different ones of my people. I myself have not done any research firsthand on it. But we had some folks who would qualify for that request in the type of work they did.

And so I helped get the right parties together and briefly look at what we gave back. Again, that was FDA lawyer to our lawyer, and we have our own counsel in R & D because of our governmental regulatory requirements. So at that time, it was Chuck Blixt. And Chuck worked with me and others in R & D to get those documents together, and that's the only other example I know of.

Q. Do you have an index of the documents that were provided to the FDA?
A. I do not. Chuck Blixt may, I don't.

Q. Were any documents gathered that were not provided to the FDA?
A. I don't know of any. I don't know. Not to my

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knowledge.

Q. Were former employees asked if they had any documents in their possession?

A. I don't know. I would suspect that Alan Rodgman may have been asked that question, but I don't know. Since I was only here since 1984, if any of that took place, I wouldn't have been involved.

Q. Why do you think Rodgman was asked if he had any documents responsive to the FDA request?

MR. BELASIC: Objection. It calls for speculation. You can answer.

THE WITNESS: Alan, being the head of chemical research when he was here, just makes sense to me he may have been asked for it. Some of the folks that were at, and still are, at Reynolds worked for Alan Rodgman. And I just recall talking with some of them at the time, John Reynolds and a few others. And they said, "Well, back when I worked for Alan Rodgman, we did such and thus or this and that." So I'm sure that they and Chuck Blixt would have decided whether to ask Alan for any of his recollection.

Q. Anyone other than Rodgman?

A. I don't know of anyone.

Q. Former employees?

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A. I don't know of any. There may have been, but I don't know of any. Since the people that I recruited and helped recruit would have been involved from '84 on, I deferred such questions to people like Don deBethizy or John Robinson. They would have handled historical documents as well as documents from '84 to '94.

Q. Have any attorneys attempted to interview you concerning your work at Reynolds?

A. No.

Q. Other than in-house attorneys or Reynolds attorneys?

A. None that I know of. I'm sitting here -- during that request that I shared with you, that after the Waxman hearings -- I believe the FDA lawyer said that FDA scientists might want to talk to Dr. Burger and others. And that was passed on to me and I said, "Fine." But they never asked, but --

Q. They never came back?

A. No, they just said they might want to talk to us. They said -- they said they might want to talk with us about Eclipse last year and we said we were quite willing to meet with them.

Q. Has anyone from the justice department attempted to interview you?

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A. No, not me.

Q. Anyone from --

A. As I said earlier, they talked with Dave Townsend and Bob Perfetti. Bob DiMarco told me they had talked to him, but he was retired.

Q. The justice department?

A. As I understand it, if he had the right guys that showed up at his house. He just shared with me that some guys from the justice department came by and talked to him. FDA and the justice -- I don't know which was which, or who was who.

Q. And when did the justice department talk to DiMarco?

A. It was either FDA or justice or both. And it would have been late '94 or early '95 probably.

Q. On what topics?

A. Same ones that this FDA request was on probably. And they wanted to talk to him about what Reynolds had done on product modification and Premier and other things.

Q. And the justice department talked to Townsend?

A. When the investigators came down -- if I have my details straight, Dave Townsend and Tom Perfetti gave them a guided tour of our process, the tobacco

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process. Went over and showed them how we did things -- regular, everyday what we do. And they walked through that process and some peripheral processes like Shed 181, reconstituted sheet. I think they showed them the G-13 process or the expanded tobacco. They just showed them everything we do to tobacco when we get it, from stem to stern.

Q. Was it Townsend and Perfetti?

A. They were two of the people involved. I think Watt Dufour was, but I'm not certain -- and some of the engineers, but I don't know who the engineers were.

Q. Did they show them all the plants that made reconstituted tobacco?

A. You'd have to ask them. They probably did. We have the main manufacturing place and we have what's called Shed 181, where they went through all that stuff. So to my knowledge, that's the only ones we had.

Q. Did you provide -- did they provide the justice department with a list of the ingredients in cigarettes?

A. They didn't in that process. We provide HHS that list every year for tobacco and tobacco processing.

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Q. HHS is what?

A. Human and Health Services, the old NIH. The old -- you know, they renamed it back, I think, in the Carter administration or somewhere thereabouts.

Q. Do you know of anyone else who was interviewed by the justice department?

A. No, I don't. I'm sitting here tying to think -- if you'll give me a moment.

Q. And when I say justice department, I'm including the FBI.

A. I don't know of anyone. I don't know -- the only people I know that have interviewed is who I already told you. And I believe both FDA investigators and justice investigators, the two different visits were who was talked with whom. In the case of Bob DiMarco, I got the impression that either FDA or justice department or both went to visit him, but you'll have to ask him who it was.

Q. Do you know of anyone at Reynolds that has been called to testify before a grand jury?

A. Before a grand jury?

Q. Yes.

A. Obviously we've had expert testimony in court cases before a jury. I don't know of grand jury. Could have been, but I don't know. I'm not really

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interested in that kind of stuff so I don't ask a lot of questions about it, I'm sorry to say.

Q. Have you provided any legal support since '84?

A. I've been asked from time to time by our lawyers in-house.

MR. BELASIC: Before you go on, Dr. Burger.

THE WITNESS: Yeah.

MR. BELASIC: Let me instruct you not to answer as to any communications with lawyers for Reynolds -- and that's either in-house, or Jones Day or Womble Carlyle obviously because it falls under the attorney-client privilege. Now, to the extent that you can answer questions that don't have to do with those privileged communications, you can.

A. Well, in that case what I started to say was all I'll say. When articles come out from time to time on tobacco, tobacco products or issues around them, I'm occasionally asked by some of our counsel what my opinion is on that literature. I'm not a witness for them. They just want to know what my scientific opinion is.

Q. Other than the opinion on articles that you provide legal consult, have you provided any

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legal assistance with respect to any of the work that you've done at Reynolds?

A. When we've had interactions with FDA or EPA or maybe on one or two occasions with FTC, I'm often asked, "What do you think we ought to do? Should we approach them or wait for them to ask that kind of stuff?" So that's the closest to advice, I guess, that I give.

Q. Ever give any advice or consultation in any specific legal case?

A. No. No, there was one case -- because I'm a pathologist, our in-house lawyer just asked me what a carcinoid was. And I gave him the classical answer and referred him to a pathologist in California who studied them quite a bit.

Q. What's a carcinoid?

A. It's a tumor of neuroendocrine cells in the lung. I believe it was the Cippilone case. There was a debate in the courtroom according to the papers as to whether Ruth Cippilone had had a carcinoid, which is not related to smoking or another kind of tumor that may have been related to smoking.

So I gave them an authority, Dr. James Bennington, out in California if they wanted to know what a carcinoid was. He was as good a resource to

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find the answer to that as anyone I knew. I told them what it was in comparative pathology. It's a tumor of the neuroendocrine cells.

Q. Do you smoke?

A. I smoke a pipe and occasional cigar. In R & D I will try a new product from time to time. Like Bill Clinton, I don't inhale. So I do try an occasional cigarette, but I'm not a cigarette smoker.

Q. Have you ever smoked cigarettes?

A. I certainly did in college sometimes when we would have these study sessions. Everybody else in the room would be smoking and I guess I did, too, for self-preservation.

Q. What do you mean by that?

A. Well, for some reason, when I was, you know, in college and in the army -- if I was in a room full of smokers, if I would smoke -- again, I don't inhale because it irritates me too much -- I don't get irritated by their smoke. Beats the heck out of me why, but that seems to be the case. And we believe, you know, our coffee and our smoking helped keep us awake. Whether that was true or not, I don't know. We crammed too much.

Q. Does anyone in your family smoke?

A. In my immediate family, my wife and children,

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no. I think my son has maybe on five occasions in his life has tried a cigar, if that many times. No one smokes. I don't think my wife or my daughter have ever touched a cigarette in terms of smoking it. In my extended family, most of my uncles smoke. My parents smoked when they were alive. My mother quit when she was in her forties. My dad smoked up until the time he died in a plane incident in Vietnam. He was 47.

Q. Your dad was in the military in Vietnam?

A. No, he was a civilian agricultural expert. He was in USAID, Agricultural International development. Sort of the establishment's peace corps.

Q. Were you ever in Vietnam?

A. No, I was not. I was in the army during Vietnam, but they had me in research labs. And by that time Richard Nixon had come to the presidency and they were trying not to send people, as I understood it, who had lost family members in Vietnam.

Q. You never did any research related to Agent Orange?

A. No. No, I'm familiar with the debate and what the National Tox Center looked at with dioxin and some of its impurities, but I wasn't involved in

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those studies.

Q. What was your opinion of the debate?

A. I think certainly Agent Orange could cause skin problems. I think it was far from conclusive that it caused leukemias or lymphomas. The defoliant -- there was a possibility that there was a contaminant or impurity that might have increased the risk, but the dioxin itself I don't think, and still don't think, the evidence is proof positive of causation there.

It's a very complicated issue. You've got an agent that people were exposed to erratically in a short period of time and a very mixed bag of epidemiology from it.

Q. Do toxologists -- toxicologists look at statistical data in arriving at conclusions as to cause and effect between chemicals and diseases?

A. They use a lot of tools. That's one of them.

Q. What are the tools?

A. The testing I mentioned earlier. Toxicologists, of course, use that. Whether it be cell culture or in vitro, or animal in vivo. They will look as part of the weight of evidence, the epidemiology reports. In the context of the studies that I'm referring to -- and there's chemistry that

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we do as well, of course. They use statistical analyses to see if something is significant or not.

Q. Have you since '84 used those tests to determine if there is a link between smoking and disease?

A. We have used similar statistics in our comparative toxicology testing that they would use in a smoking etiology study. If they were to -- for example, if they came up with a new lab animal model -- some Asian rodent or something that they believe they could give -- get cancer from cigarette whole smoke. They would use that animal model and use the same statistics that we use in our comparative toxicology work or in our molecular toxicology work. Some of the same statistics. Analysis of variants, fish are exact [PHONETIC]. There's probably four or five commonly used statistical formulas to arrive at significance. And one of the greatest debates is which one is the most appropriate. So you end up doing many of them instead of one of them.

Q. Did you use any other methods such as cell testing, epidemiological results, chemistry?

A. What we rely on for epidemiology is what's in the literature. And for example, someone suggests

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that -- like they did in the early eighties -- that flue-cured tobacco, Virginia blend tobaccos are less carcinogenic than American blend. We would look at those statistics. We'd look at our toxicology studies to see -- or the chemical studies to see if there is any explanation as to what was reported.

There was a lot of criticism in the early eighties of those English reports because they used burley air -- air-cured and they used burley flue-cured and they used flue-cured both ways -- to analyze some blood changes in people and that sort of thing. But they weren't -- they didn't have a good set of populations of people that smoked all flue-cured tobacco for 30 years and versus American blend tobacco for 30 years, so the studies were limited.

So we would look at what they saw and reported and we looked in-house at a blend we were very interested in and still are -- that's a low nitrogen blend. Because we didn't -- if flue-cured was thought to be more toxic than American blend, then that might not be a good way to go. So we looked at the chemistry of our cigarettes and used the statistics similar to some that were used in the literature in those particular set of studies. So we

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use similar tools is what I'm trying to say and we use the literature.

Q. Okay.

A. But we don't do in-house much -- except for molecular toxicology, much basic smoking and health research. We leave that up to the medical institutions. We follow them with great interest.

And we've been looking at -- we haven't been able to figure it out yet -- oncogene assays to use because we've been following that literature very closely. In molecular toxicology, we've done some adduct work in recent years. And we do use it in product testing because of the state of art of the research out there. We know it has its limitations, but we think it's where the future is heading in product testing.

Q. Why does Reynolds leave the health issues to the medical institutions?

MR. BELASIC: Objection. That misstates his testimony.

A. We have experts in-house whose best contribution is through product design and modification. We interact with those folks interested in basic research and medical institutions. We feed off each other. I'll give

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you've one example, if you want.

Q. Is it going to answer my question as to why --

A. Yeah.

Q. -- Reynolds relies on medical institutions for health issues?

A. Yeah, if you're patient enough. If you're impatient, I won't get there.

Q. I'll see.

A. Let me give it a shot. We did some urinary mutagenicity studies in Premier and Eclipse. The NCI people were greatly interested in those and came and talked with us because they were -- they had done some studies like that and they weren't able to do the controls that we did. So they were very interested in our studies so they could change their approach. Smoking and diet studies they were doing.

We also learned from that discussion some of the things that they did so in future studies we could do the same. So they do basic research. We do testing -- comparative testing, but we -- we interact with each other to learn from each other. So we leave the real basic stuff to the people who the taxpayers and the government provide funding for to do it.

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We have funded some of that work ourselves over the years and we follow it closely. We capture the toxicologist's approach, product comparison approach, biochemical approach. That's our expertise. Some of it is indirectly relevant to smoking and health research, some of it is not.

Q. What do you mean by the basic stuff?

A. Well, we do some like DNA adducts and skin painting and inhalation studies. And we publish it and we get a lot of phone calls on it, a lot of reprint requests and requests for people to present. This November --

Q. Excuse me. Let me cut you off.

A. Sure.

Q. You said you left the basic stuff to the taxpayers and the governments to fund. That's what I meant by what did you mean by basic stuff?

A. Not all of it. I said we have funded some and do fund some. But I can't be the center for all Nobel Prize medical research, even if it's on smoking. There's not enough resources in the world for me to afford to do that. That's best handled by -- in my opinion, by the public health community and the medical research.

We do some, as I've stated, and we have funded

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some. But our responsibility, I believe, is to meet the needs of our smokers, what they want and to try to understand the product as best we can. That means there's a lot of things in basic smoking and health that we wouldn't get into.

Q. Do you consider the health consequences of smoking a need of smokers?

A. They have told us they would like cigarettes that are less toxic, less hazardous or of less risk. We try to react and respond to that in the cases of the three products I mentioned to you earlier by developing those products that have less compounds of concern in the smoke and less biological and toxicological activity.

Q. Do you consider those cigarettes safer cigarettes?

A. There may be, but there is no way I can prove it. I don't have the animal models or the cell models, so I consider them to have a potential to be of less risk or safer -- the potential to, but I can't say they are safer because I just can't measure it or prove it.

Q. Have you been -- how long were you director of toxicology?

A. From 1980 -- late '84 to June of 1990.

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Q. What happened in June of '90?

A. Well, Premier bombed. Didn't taste good enough, too hard to light, a number of things -- so we didn't give up. We said there's got to be a way to make a better tasting tobacco heating cigarette.

So we formed a new department. It's called advanced technology products and they asked me to be head of it because of my interest in the area and because of my ability to manage people. That's what they told me anyway.

Q. And what was your title?

A. I was vice president of advanced technology products. From June of '90.

Q. Until?

A. Until October of '92. Dr. Carl Ehmann -- Dr. Bob DiMarco retired and Dr. Carl Ehmann was hired as his replacement and he reorganized. So I had all of product development, not just advanced technology products from '92 to last May.

Q. I'm sorry. You had all of what?

A. Product development. For a period of time I had brands, too.

Q. When was that?

A. As I said, from late '92 to May of last year -- May of '96.

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Q. How was that different from advanced technical products?

A. It included advanced technology products, but I had other areas of product development under me. Somewhere about late '93, I had part of toxicology put under me again.

Q. Until when?

A. Until last May when I became director of R & D, senior president of R & D.

Q. May of this year?

A. May of '96.

Q. Oh, May of '96. Your title was what?

A. Senior vice president, director R & D.

Q. And who was your boss?

A. Andy Schindler is my boss.

Q. Since May of '96?

A. That's correct. It was official in June. They asked me to take the job in late May. The job became official in June.

Q. Why did Wallace Hayes leave Reynolds?

A. You'll have to ask him. He left here to go to be on faculty at Bowman Gray. My impression is since he or someone he wanted to get director of R & D didn't get it, he didn't want to stay. They brought in an outsider. I don't think he liked that.

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Q. Who did he want to get it?

A. Probably himself or me or someone like us. Someone who understood toxicology. That's sort of -- I mean, that's the essence of what he said. "Well, you know, I think I'm going to move on since you or I or someone like us didn't get it." That was the essence of the conversation.

Q. Did you know David Isbister?

A. Isbister.

Q. Isbister?

A. He was Bob DiMarco's boss for a year or two, maybe two years. He had R & D. He was on the executive committee. I think he was an executive vice president and Bob DiMarco as head of R & D reported to him for a couple of years.

Q. Do you know why he left Reynolds?

A. I really don't know. I was -- and I still am. I don't see Dave much anymore. I was friendly with Dave, nice guy. But I assumed that he and Lou Gerstner and others just didn't have good chemistry so Dave decided to leave.

But you'll have to ask him. I never asked him that question. It seemed to me to be a rude question to pose to him when he tells me he's leaving, so I didn't pose it to him.

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Q. Do you know Anthony Colucci?
A. Yes, I know Tony Colucci.
Q. How well do you know him?
A. Well, he was here when I came in '84. And somewhere around '89 or '88, he left.
Q. Do you know why he left?
A. Well, I can only tell you what he told me. He wanted to be a consultant for a legal firm.
Q. Which firm?
A. Well, I think there were several. Womble Carlyle was one of them, but I think there were several. He was just a, you know, scientific consultant.
Q. When was the last time that you spoke to him?
A. I saw him -- it would have been my daughter's freshman year. Between my daughter's freshman and sophomore year at a riding stable, so that would have been four years ago, four and a half.
Q. Does he still live in the area?
A. Does he still live in this area? I don't know. I heard he lived in Texas. A retiree named Jerry Shiffert who used to have agricultural sciences called me last year and said he was on vacation and stopped by to see Tony in the Galveston area.

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Q. Did you have the opportunity to get to know Mr. Colucci to the point where you can express an opinion as to his creditability?

A. Yes, I suppose I did.

Q. What's your opinion as to his creditability?

A. Well, I think when it comes to understanding the science he's very creditable. But how he interprets science seems to be whatever you want him to be. He seems to be very pliable.

Q. And what is that based upon?

A. Well, he told me one time in one of the law firms that he was consulting with, that they got upset with him because he had answered the question differently one day than he had another. And his response to them was, "Well, what do you want me to say?"

That was -- plus he would vacillate on whether or not product modifications should be our highest priority or a lower priority. Those two kinds of phenomena is why I'd say he might be too pliable in his interpretation of science.

THE VIDEOGRAPHER: Mr. Maistros, I'm out of time.

MR. MAISTROS: I'm sorry.

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THE VIDEOGRAPHER: I'm out of time on the videotape. We're going off the record at 11:32 a.m..

(DISCUSSION OFF THE RECORD.)

(RECESS TAKEN FROM 11:32 A.M. TO 11:35 A.M.)

THE VIDEOGRAPHER: This is tape two of the videotaped deposition of Gary Burger, Ph.D.. We're going back on the record at 11:35 a.m..

BY MR. MAISTROS:

Q. A couple of things I want to go back to. Prior to your deposition today, did you read any depositions of anyone else who had been deposed at Reynolds?

A. No.

Q. Did you review any statements of any sort of anyone who had been deposed?

A. Well, I read the newspapers of the case that Dave Townsend was involved in because he works for me and I followed what the newspapers said about his testimony. And when -- the only other deposition I ever read was Bennett LeBow's deposition that was on the internet. I read it, or parts of it. I didn't read every line of it. Like 80 or 90 pages long.

Q. What did you think of his deposition?

A. Well, it seemed to me there were a lot of questions and not many answers. There was a lot of

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"I don't know" or "I never got involved in that." You know, a lot of responses like that. So that's why I guess I gave up trying to read the whole thing because it just seemed to be the same thing over and over.

Q. Are you computer literate, as they say?

A. I used to be. The technology has gone off and left me. I can do -- I understand the concepts of the computer. I can, with a mouse, get stuff out of my computer, but I'm very poor on the keyboard.

Q. Did you have any Reynolds-related work on your computer at home?

A. No, none whatsoever.

Q. Do you have a computer at home?

A. Pardon me?

Q. Do you have a computer at home?

A. Oh, yes. My son is a computer engineer. I can't get by without one at home.

Q. Has anyone in your family ever worked at Reynolds?

A. My son has worked as a summer student two summers and two other summers as a contract employee over in a subsidiary coupon outfit. Other than that, nobody.

Q. Do you have any Reynolds-related

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documents at your home?
A. I don't believe I do. I have -- I have my what's called CIP or investment plan. I have Reynolds readouts from that and my benefits. Those are Reynolds documents, and any stock documents I have.

There may be. I'm a pack rat. I may have -- whatever I've got at home, I've got a copy of it, but I don't think I have anything in my office. I'm sitting here trying to think when I dump my car out to go on a vacation earlier this summer, I might -- I might have a document or two in my garage, but I don't think I do.

Q. Have you discussed with anyone that has been deposed recently their deposition testimony?
A. I've had people -- because they work for me, say, "Well, I felt pretty good" or "I felt pretty bad." And I said, "Why do you feel that way?" And they might have said, "Well, I answered a question differently than I wished I had because I wasn't as thorough." That's the limit of it.

Q. Who have you spoken to about their depositions?
A. Well, this summer, the three people that I've talked to are Dave Townsend, Jeff Gentry and Don

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deBethizy, just to tell me how they felt. Jeff Gentry didn't have any specific questions. He just felt his deposition was faster and easier than he thought it would be.

Dave shared with me that some plaintiff's lawyer got angry at him and he wished he had been able not to provoke the guy. In Don's case, he was asking me why I had a certain book in my room because he was asked -- in my office because he was asked a question about that book and he thought maybe I had heard about that, but I hadn't.

Q. And what book was that?

A. Goodman and Gilman's book on pharmacology, Principles of Pharmacology. And the reason I had gotten that book out is because I had read an article about the paradox of epinephrine and norepinephrine. And I remembered the paradox of nicotine and I wanted to go look those two up. And Don thought I was -- for this deposition maybe that I was getting it out for that, but I wasn't.

Q. What's the paradox with nicotine?

A. Well, nicotine and -- after I looked it up in Goodman Gilman, I came across that very term in another paper by a guy out of southern Illinois, Dave Gilbert. But the paradox of nicotine is that it can

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be -- it can stimulate or it can relax. Smokers can have lower blood pressure after they've smoked for a while rather than higher blood pressure. When someone smokes the first cigarette of the day, their heart rate may increase but after a while, it'll go back to baseline or even lower.

So that seems to be counter-intuitive, but that's the same story on norepinephrine and epinephrine. They can stimulate the sympathetic nervous system or the parasympathetic nervous system both and they work against each other in terms of their effects. One relaxes or one carries on normal activities. The other one is more of a motor activity alert, cognizant, conscious approach -- reaction to the stimuli.

But norepinephrine and epinephrine stimulate both parts of the nervous system. So nicotine can relax or stimulate pharmacologically. Norepinephrine, for example, can do the same thing. So those two compounds were used when I went through pharmacology as examples of a paradox.

Q. Did you discuss with any of the following people their depositions -- Mr. Lippiello?

A. No.

Q. Mr. Pritchard?

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A. No.

Q. Mr. Sommers?

A. Sommers? The only Sommers I know used to be CTR chairman.

Q. Mr. Simmons?

A. No, I have not discussed his deposition. Sam lets me know how many he's got scheduled. That's all we discuss.

Q. Mr. Rodgman?

A. Dr. Rodgman and I have had conversations recently, but not about depositions.

Q. How about DiMarco?

A. No, I'm the one that called Bob DiMarco and told him I hear he's going to be deposed, but that's about the only discussion we had.

Q. How about Reynolds?

A. John Reynolds?

Q. Yes.

A. I have not talked to him about his deposition. He used to work for me also.

Q. John Robinson?

A. No. I talked to John Robinson about how a small claims court thing went out on the West Coast. I was concerned that John has a lot of work to do and he gets getting involved in these court cases. So I

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was really interested in how provoked he was becoming in trying to get a lot of work done and being in these cases. But we didn't talk about -- in that small claims court case, we didn't talk about Q&A's.

Q. How about Wallace Hayes?

A. Not at all. Back to John Robinson, I told him that I would like a copy of some of his publications to refresh my memory about the debate about addiction. We didn't talk about it. He just sent me up his publications.

Q. Did you review those?

A. Very briefly. I just read the summaries. Since John has worked for me, I've been involved in looking at presentations and giving him critiques that he makes at scientific meetings, so I was familiar with what was in them. It was just a refresher.

Q. When I was asking you about questions related to the control of nicotine or effects on nicotine, did you understand my questions to imply from '84 to the present? That is, what processes Reynolds used?

A. Well, that's the reference point from which I answered.

Q. You didn't stop when you left toxicology

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in answering my question?

A. No.

Q. As --

A. My answers are based on '84 to now, my perspective and my knowledge.

Q. And as vice president of advanced technology, was toxicology under you?

A. No. That two years to three years because when I became vice president of product development and assessment, for about a year I did not have toxicology under me.

Q. So from '84 to '97, you've had some supervisory role over toxicology, but for a year to two years?

A. For about two and a half years, I did not. Two and a half, almost three.

Q. Sometime in '93 to '96?

A. Ninety to probably '93, I did not have -- June of '90 to very late in '93, I had no toxicology folks reporting to me. We have a peer review process where we -- because I came from toxicology and I published and presented in toxicology, they would bring me in during that three-year gap, or two-and-a-half to three-year gap to review presentations. We beat up on each other before we go to a scientific meeting.

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We're our own worst critics. So I'd be part of that process.

Q. Did you hold any positions at Reynolds that you haven't told me about since '84?

A. No, I believe we've covered them all.

Q. Were you on any committees that you haven't discussed?

A. I've been on committees. Would you like a list of some of the committees that I've been on? Is that what you're asking?

Q. Sure.

A. I was on the president's committee when I was director of toxicology when we had a CEO by the name of Von Arx. He took what was considered strong middle managers from every functional area and put together a president's committee. Dealt with cultural issues in the company, change and what kind of compensations and review processes we had and how to improve them.

I have been on sort of ad hoc committees on purchasing from vendors. Been on cost efficiency committees that are interfunctional. I am now on two inter-industry or extra-industry committees, CTR, since I took this job last May-June time frame. I've been on CTR. I've been on CORESTA.

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Q. What is CTR?

A. Council for Tobacco Research.

Q. And how many other Reynolds employees are on CTR?

A. Well, on the -- on the advisory board which I serve, it's only me. On the -- I can have a guest with me when we're talking about points of interest in their areas. They have what's called a scientific commission. Dave Townsend is on one. Charlie Green is on one. Layton Davis is on the agricultural committee.

There is an employee in Europe for Tobacco International that's on a committee. Lutz Mueller is his name. He's a Ph.D.. They have a committee on roll your own cigarettes and how should they be tested and how they shouldn't be smoked for chemistry. He's on that committee.

We have a scientist at Avoca who's an agronomist, Brian Smeeton. He occasionally goes to their agronomy or agricultural committee, but I don't believe he's a member. And those are the only ones that I know of.

Q. Prior to your most recent position, were you a member of CTR, although not on the advisory board?

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A. No. No. I was asked to attend a CTR meeting probably 1985, '86 where Dr. Barry Pierce presented his work. He's a pathologist. Since I'm a pathologist, they wanted me to go hear what he had to say and tell them, you know, how good the work was. What they didn't know was I knew Dr. Pierce from the National Academy of Sciences when I was at the NCTR, so I was glad to go to get to see him again.

I was asked to go to CTR -- that's why I thought you were talking about Sheldon Sommers or Charlie Sommers. He asked me to look over some publications one of their grantees was submitting to JNCI, Journal of National Cancer Institute, which I did.

Q. What is the purpose of Council for Tobacco Research?

A. It's to fund basic and relative research to smoking and health issues. And as I mentioned earlier, that's one of the mechanisms Reynolds has used to fund research in smoking and health or smoking and health related areas.

Q. Does CTR have its own legal counsel?

A. I believe they do.

Q. Who's that?

A. I don't know. I've met him, but I don't

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remember his name. He came to one board meeting to explain their legal fees. The scientific director Jim Glenn was rather provoked that his legal fees had gone up a lot, so he made his counsel come and explain. That's the only time I met him, but I don't remember the name of the firm.

Q. Who --

A. It's probably in my CTR files. If you need to know, I can look them up.

MR. MAISTROS: That's another set of documents we'll request and fight about later.

Q. Is there a budget for CTR?

A. Yes. They have approximately a 30 million dollar budget as I understand. It's approximate. I don't have the exact figure.

Q. Is that a year?

A. Yeah. At least 20 million of it has to be used for research only.

Q. As opposed to administrative or --

A. Administrative and legal costs have become -- begun to gobble up its fraction of the budget. All these cases -- I don't know about this one, but other cases have run their legal costs up.

Q. Who funds CTR?

A. The tobacco industry members.

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Q. Which are who?
A. Well, the ones that I'm aware of -- I don't know about Liggett, but B & W, Lorillard, Philip Morris and Reynolds. I don't think Liggett does.
Q. Do they all fund it on the same percentage basis?
A. It's based on, as I believe -- and I'm certainly not an authority here -- a share of the market. We all have our set membership contributions.
Q. Are minutes kept of CTR meetings?
A. Yes.
Q. Who keeps those?
A. Dr. Glenn and his staff.
Q. Are all meetings attended by legal counsel?
A. The -- I've only been to two meetings. And I've certainly had meetings with Dr. Glenn. No lawyers were present in any of those but one. And there's the one I was referring to when he had his legal counsel in.

The guys from Reynolds that have been there are Andy Schindler and me. I don't really know the other representatives from the other companies. I don't know who's a lawyer and who isn't. I know Alex

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Spears is not a lawyer. He's there from Lorillard. And I know Mr. Morgan from Philip Morris is not a lawyer. The other person that attends may be. I don't know.

Q. When were the two meetings you attended?

A. Well, they had one -- I attended one back in June, I believe it was. Late June.

MS. KNISELY: Of this year?

A. Yeah. And one in December of last year. And they have them -- they have them usually twice a year for the board members.

Q. Are nontobacco industry individuals permitted to attend?

A. Well, the staff from CTR -- Dr. McAllister, Dr. Glenn. And they have a business -- or office manager would be a better term. Because they have no business, but she handles the books and the allocations. I forget her name. She's often there.

Q. Does CTR itself do any research or do they just fund research?

A. They have -- they have a scientific advisory board that's full of very well-known names in science, really blue chip kinds of individuals. They decide where the funding goes for the research. We don't have any input there.

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Q. What did you talk about at your December '96 meeting?

A. We had one of the recipients come and tell us about some work -- cell culture work she had done. I forget her name, but it was interesting work. And they gave us a report on how many projects are funded, how many of them are winding down, how many applications for the coming year they've gotten thus far.

And they talk about -- they give -- Dr. McAllister usually gives us publications that have come out of this funded work. And he has to be kind of picky because there's -- well, for example, Business World and News Reports this year had a report on the top 25 medical schools in the country. Twenty-four of them are actively being funded by CTR and the 25th one was the University of Pittsburgh and it had just -- the year before, it had run out. It had done its project and finished up.

So you have some pretty prestigious work to choose from if you're Dr. McAllister to share with the board. You have to be somewhat selective. You can't give any every university's work, so he tries to pick ones he thinks are their most interesting. He tries to give us a feel for how other publications

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cite CTR-funded work.

He tries to keep a running estimate of that, other work cited as he calls it. We usually hear from him on that at each meeting.

Q. And do you recall anything that you discussed at the June, '97 meeting?

A. Well, we discussed legal costs. That was the main meeting with their counsel, briefly.

MR. BELASIC: (Indicating.)

Q. What legal costs had CTR incurred?

MR. BELASIC: Let me object to any further discussion of the communications between CTR counsel and the members of CTR.

MR. MAISTROS: Now, is this a RJR attorney-client privilege objection to questions about CTR?

MR. BELASIC: On Reynolds -- on Reynolds, sure.

MR. MAISTROS: So Reynolds the company is raising attorney-client privilege on communications between this witness and CTR?

MR. BELASIC: No, that's not correct.

MR. MAISTROS: Okay. So there's no attorney-client privileges there that Reynolds could assert with CTR?

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MR. BELASIC: It's not -- it's not Reynolds.

MR. MAISTROS: You're asserting it on behalf of CTR?

MR. BELASIC: Well, you are inquiring into CTR privilege.

MR. MAISTROS: Are you --

MR. BELASIC: I don't represent CTR. I agree.

MR. MAISTROS: Are you -- okay. Are you asserting an attorney-client privilege on behalf of Council for Tobacco Research?

MR. BEIASIC: I don't represent CTR.

Q. Okay. So you can answer then.

A. As I was starting to say, that was the meeting where their legal representative explained why their fee was what it was.

Q. Why were the fees high?

A. Their members of staff of CTR having to go to court a lot these days, as I understand it. Being deposed a lot, that kind of thing.

Q. What else was discussed?

A. Dr. McAllister gave us another update on the results of a scientific advisory board meeting previously held and how many projects were funded and

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how many applications they already have for the next cycle. Gave us again some citations from literature on some very good work that was done with CTR funds.

We had a discussion about regulations being negotiated that asked for the abolishment of CTR. Dr. Glenn was wanting to know, "What do I tell my staff? You know, where is this going to head?" We don't know, but you know you have to be prepared for the worse. That was the nature of the discussion. So CTR may cease to -- and likely will cease to exist from the sounds of the printed regulations as I saw them later.

Q. What regulations did you see?

A. The one that was in the press and on the internet where the attorneys general and representatives of the tobacco industry are negotiating a settlement as to regulations.

Q. Did you --

A. And in the document that I read, it says that Tobacco Institute and CTR will cease to exit.

Q. What's the Tobacco Institute?

A. It's, you know, representative of the industry in Washington, D.C.. I don't know much about them. I don't go there. The only time I've ever met anybody from T.I. was when -- at a CIAR meeting,

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which was a committee I forgot to tell you about. I'm sitting here thinking about Tobacco Institute and I remember another committee I was on -- the Center for Indoor Air Research. But anyway, at one of their meetings when I was a member early on, there was a Tobacco Institute person there wanting to know what CIAR was, a guest.

Q. The members of the scientific advisory board for the Council for Tobacco Research, who selects them?

A. Well, in Reynolds' case, the head of R&D and the CEO of the domestic company are the members. But I don't know how it's selected at other companies. That's just the way it is here.

Q. So the scientific advisory board is made up of members of the various tobacco companies?

A. Oh, I'm sorry. I misunderstood your question. The scientific advisory board is selected by themselves -- you know, the members have rotated off. The advisory board helps Dr. Glenn or the director of CTR sort through the applications for new membership on the scientific advisory board. They do that. I'm not, nor any member, is involved in that from the tobacco industry.

The advisory board -- not the scientific

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advisory board of the CTR are the sponsors. And the question I answered was how we, Reynolds, selects who we have on a member of that board.

Q. Okay. I'm talking about the scientific advisory board.

A. We don't have any input whatsoever.

Q. Are members of the scientific advisory board also employees of any tobacco companies?

A. No.

Q. Are they recipients of grants from tobacco companies?

A. I don't think they are recipients when they are on the scientific advisory board. One, Dr. Barry Pierce, I mentioned earlier, is now on the scientific advisory board. Many years ago he got a grant from CTR. But that's not required or is a disqualifier for membership.

I said I don't have any input. Dr. Glenn asked me this summer when I was there, did I have any suggestions of anybody that might be good replacements for Dr. Pierce when he came off. Since I'm a pathologist and Dr. Pierce is a pathologist, did I have any opinions of who might be some good name pathologists to go after. But I'm not involved in the process. He just was wondering what I

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thought.

Q. Has the scientific advisory -- oh, I'm sorry. Has the Council for Tobacco Research done research which is specifically targeted at exploring the alleged health risks related to smoking?

A. Well, yes, there are studies that they have funded ever since I've known about them. And I've seen their annual reports that are smoking and health related. And you can get any -- they have an annual report that gives all the status of their ongoing funded work and they are broken up into different categories -- lung disease, heart disease, genetics, immunology. There are several -- seven or eight categories, but those are a few of them.

Q. Have they done research to your knowledge with respect to nicotine and potential adverse health effects related to nicotine?

A. Well, the lady that I spoke of last December that was there making her presentations work was on cell cultures and nicotine and its effect on catecholamine release. So that could be classified as what you're talking about.

Q. Are you aware of any research that CTR has funded that looked at the issue of nicotine being a potential tumor promoter or precursor?

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A. They may have. I'm not aware of it.

Q. Have you ever seen any research that has indicated that nicotine may promote tumors?

A. I've seen quite the opposite where it's been purported in the literature that they looked to see if it was a carcinogen or a promoter and found it was not.

Q. And --

A. I mean this is stuff that I've read in the literature and especially early literature. Because about 10 or 15 years ago, a lot of people were looking at nicotine and its relationship to cancer.

Q. Have you seen anything, say, since 1990 on that research has indicated that nicotine might promote tumors?

A. Not per se. I've seen speculation in the literature that nicotine in the animal or human body might be converted to tobacco-specific nitrosamines, but it was conjecture and there was no data to confirm it or even suggest it. And so the relationship there that was speculated upon is that nicotine might be related in the body after the smoker or the research animal is exposed to it might be converted to nitrosamines. We've done some work to show that's highly unlikely and most people agree

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with us.

The only other example I can think of is a researcher out in California, Dr. Hanspeter Witschi applied for a grant at CIAR. And he used for some background a documentation of some work done at NCI where nicotine was found to bind to neuroendocrine cells.

He had a model he was looking at that he thought might be a model for lung cancer in hamsters. And the lesions he saw were nodular hyperplasias, I told him. He thought they were neoplasias and he later found that they were hyperplasia. He thought the mechanism of causing neuroendocrine cells to proliferate might be due to nicotine. He wasn't talking about nicotine being converted to nitrosamines. He was just talking about would nicotine stimulate neuroendocrine cells to proliferate.

I was cynical, but we funded that work because nicotine binds to neuroendocrine cells and neuronal cells, but it doesn't cause them to proliferate. I mean that's never been demonstrated. But I had seen a reference, to answer your question, about nicotine and cancer. Those are the two examples that come to my mind.

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Q. Since '84, has to your knowledge Reynolds done any in-house research with respect to the potential for nicotine to promote tumors and cause cancer?

A. The work I referred to just then, Dr. Bill Caldwell was looking at the nitrosation of nicotine to see if it forms tobacco-specific nitrosamines or other nitrosamines thought to be carcinogenic. What he found was it formed a nitrosamine that's not carcinogenic, that is not a toxicological concern. He did not find any evidence for NNN, NAT or an NNK to be formed. And he published that work and presented it.

Q. Let's assume for a moment that you came across a article that was published by a well-respected scientist and funded by a well-respected group that came to the conclusion that there was an association between nicotine and tumors. Let's just assume that that was the conclusion of this author.

A. Uh-huh.

Q. If you came across that literature, would that prompt you as director of toxicology or in any other position you held at Reynolds to undertake in-house tests to verify or confirm the accuracy of

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that data?

MR. BELASIC: Object to the improper hypothetical.

THE WITNESS: Go ahead and answer it?

MR. BELASIC: Yes.

A. Yeah, we'd probably -- that's what we'd probably do. That's what we did in that case that I just gave you. The accusation was nitrosamines are formed in the body from nicotine. We explored that right away as soon as we heard about it. And to see -- I mean, we didn't know. Is it real or is it not? Will it happen?

And we had some very good chemists, world-class. And quite honestly, I think we have better tobacco chemists than anybody in the world. And so we took after it to see if it was true or not.

Q. Who in --

A. In your hypothetical case, that's what we'd do.

Q. And who would have been responsible since 1984 for canvassing the literature, if you will, to determine if there were such articles out there?

A. Well, Don deBethizy, Bill Caldwell. Sam Simmons, you mentioned, would be involved from his perspective -- smoking and health perspective. There is a man that works for Dr. deBethizy, Carr Smith.

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He does a lot of literature work also.

So at least those folks would probably go after the literature if something new came out in nicotine and evaluate it. And advise me on what we ought to be doing or not doing. I rely on them since they are the experts in those areas.

Q. Within the toxicology group that you led, was there any research being undertaken to determine if nicotine was addictive?

A. That wouldn't have been in my group. The evaluation of whether nicotine is or isn't addictive or habituating or whatever it is, would have been done by John Reynolds' group at that time, which would have included John Robinson and Wally Pritchard -- names you mentioned earlier.

Q. Which group would have responsibility for determining maximum levels of nicotine that could be taken in by humans before it became toxic?

A. Well, that's -- that was well-known before we proceeded here, so that's a question that has been answered. And that level is far higher than any cigarette in the marketplace.

Now, if a new element of some aspect of the known facts of nicotine toxicity appears, a newcomer -- a new finding -- that would be Bob Suber

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and Don deBethizy's groups. Would be someone in Bob Suber's group and a couple of chemists in Don deBethizy's group. Maybe in Dave Townsend's group because he has some of the nicotine experts. So those three gentlemen in R & D who are direct reports of mine, they and some of their staff would be the ones to go after that.

Q. Have you had annual reviews since you've been at Reynolds?

A. Yes.

Q. Who's conducted those?

A. Well, from -- from 1984 to 1990, it would have been Wally Hayes. From 1990 to '92, it would have been Bob DiMarco. And from '93 -- starting in '93 to last year, it would have been Carl Ehmann. And the last year, my new review was verbal. At my level, that's the typical case. You have a discussion about your performance, and that was Andy Schindler.

Q. During any of those reviews, were you ever -- what I'll refer to as disciplined or criticized?

A. No, I've had very good reviews. Except -- one exception. Wally Hayes once said I might want to tone down my confrontationalism.

Q. Can't believe that.

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A. I can be confrontive and confrontational.

Q. No?

A. That wasn't a discipline. I mean it was just -- it wasn't even in the write-up. It was just a comment he made. I thought that was interesting. He and I fought all the time, so he probably was asking me to take it easy on him. He's a good friend, by the way.

MR. MAISTROS: Would you mind taking a break now for lunch?

MR. BELASIC: Not at all.

MR. MAISTROS: I thought you might say that.

THE VIDEOGRAPHER: We're going off the report at 12:11 p.m..

(LUNCH RECESS TAKEN FROM 12:11 P.M. TO 1:10 P.M.)

THE VIDEOGRAPHER: We are going back on the record at 1:10 p.m.

BY MR. MAISTROS:

Q. Have you done any consultation work for any other tobacco companies?

A. No, none that I can recall. I don't believe I ever have.

Q. Has all of your compensation since '84 been from Reynolds?

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A. All but -- I've had a couple of small checks from the National Toxicology Program at NIEHS because I have served as a consultant for them in pathology issues around toxicology. That's part of the EPA family. NIEHS, National Institute Environmental Health Sciences and their branch is the National Toxicology Program.

Q. Have you received any money from RJR Nabisco?

A. Well, I'm an employee of RJR Tobacco. All my paychecks and benefits come from the tobacco company.

Q. There's no benefits that you receive from Nabisco?

A. Not that I know of. The occasional stock option that might be occur might be stocks in RJR Nabisco. That's the closest thing I know of, of anything relevant to RJR Nabisco.

Q. In any of your work that you've done since '84, have you done any studies, tests, projects for Nabisco as opposed to tobacco?

A. I have not. There have been a couple of occasions where staff who worked for me have done some things for Nabisco. We did -- we had some sort of -- they had a series of compounds they were looking at as a sugar and fat substitute. They've

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sold that technology to Pfizer, but we did some early work for them and that was done in my labs.

Q. Is that like those fat-free potato chips?

A. Yes, but it was -- that Proctor and Gamble Alestra product came out after we started this work. We had seen some publications on what eventually became Alestra. And the scientists at Nabisco had a better idea, they thought. And so we helped test the purity and the toxicology of those compounds and took it up to a point and then it was done in contract labs after that under the supervision of a toxicologist who worked for me.

Q. Who was that?

A. Johnny Hayes.

Q. And what other projects has Reynolds Tobacco toxicology done for Reynolds Nabisco?

A. None in the labs. Bob Suber has from time to time and his staff done some literature searches for them and looked into issues for them. I had a couple of product developers look at some dried fruit and dried vegetables for them as snacks, just as an early product development research set of activity, but that's not toxicology. And so the only toxicology I know of is what I've listed plus literature work and reviews that Bob Suber's group has done.

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Q. Have you ever been on any board or committee that's related to Nabisco as opposed to tobacco?

A. No, I sure haven't.

Q. Do you know if Nabisco has funded CTR?

A. No, not to my knowledge. I seriously doubt it. And we don't fund any of their GMA or anything they're on. Grocery -- Grocery Manufacturers' Association.

Q. What outside laboratories has toxicology utilized since '84?

A. Okay. We did one study at A. D. Little in Cambridge, Mass.. We've done work at Baettele, Ohio that you asked me about some of the work earlier around levulinic acid. We did some work at Baettele, Ohio on that. We did -- have done some work at Baettele Northwest, a series of inhalation studies up there.

We had an article come out. As I told you earlier, we check the literature for what our critics and folks who watch us advise us to do. And there was some work about the possibility of radioactivity of tobacco. We had Baettele do that, look at Premier and some other products.

Q. You said that A. D. Little did one

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project?

A. The only -- I mean, since '84. Did an inhalation study with Premier. I don't know what work -- I know that A. D. Little from time to time had been used by Reynolds, but I don't know what for -- before I came.

Q. Did Reynolds ever discharge A. D. Little?

A. I don't know if they ever discharged them or not. When the study was done for us, we found a better lab to do it -- Baettele Northwest for the subsequent studies, the ones after that. We didn't discharge them. We paid them for the work they did. It was satisfactory and we just chose another contract laboratory.

Q. And the work they did was on Premier?

A. Yes, it was.

Q. Was that on a 14-day mouse study?

A. It was a mouse study, I believe. And I think it was a -- had a 14-day interim, but I think it went for 30 days. But I don't remember. It was a subacute inhalation study, as I recall. I don't remember the exact dates.

Q. You don't remember any time period where the research they were doing was terminated in the middle of their research and they were discharged?

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A. No. I know on that particular study, I and some other folks had to go up there and observe what they were doing. Because it was over Christmas holidays and we were afraid they were understaffed, so we wanted to make sure they were covering their protocol.

Q. Who went with you?

A. Well, I was up there alone. Chris Coggins, who's no longer with this company, was there before I was.

Q. Do you have an opinion of Chris Coggins' creditability?

A. I think he's quite good.

Q. How about his creditability?

A. Both. He's good and his creditability is good.

Q. Did A. D. Little do any nicotine studies to your knowledge?

A. Not to my knowledge. I don't know. Dr. Sam Simmons works in R & D and he is the person at that time that was most familiar with A. D. Little. He would be the one to ask those questions. I had not worked with them in two previous companies I had worked for, so I knew very little about them.

Q. Is there an index of all the outside research that Reynolds has contracted for with these

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outside laboratories?

A. I don't know if there's a file per se. It's probably smattered across the files from different years. I don't know if there is a running index. I doubt it. I'm not aware of one.

Q. Has Reynolds contracted with any laboratories outside the United States?

A. We've given grants outside the United States to the Hannover Institute to look at Eclipse in Hannover, Germany -- appropriately named. And we have a project that's not a cigarette project that we've had a group in England -- Inverest [PHONETIC] do some work on.

Q. What project is that?

A. Well, we call it -- in-house we call it NRAD. It's analog research of nicotinics. There is a great interest right now in nicotine and nicotine analogs for Alzheimer, Parkinson, ulcerative colitis, schizophrenia. It's a whole new field opened up. It's called nicotinic agonists or nicotinics and their possibilities for therapy for neurodegenerative disease. So we've had some analogs looked at to see if maybe there are some therapeutic agents that the pharmaceutical companies would be interested in.

Q. Was that something that was discovered

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during the course of routine tobacco research or was it set up separately to look at potential use of analogs for therapeutic purposes?

A. It was set up separately for that. The idea came out of understanding nicotine and nicotine receptors. You asked me about a Pat Lippiello before. Pat was involved when I first got here in '84 in understanding the biological and toxicity of nicotine. There's a lot about it that was unknown. Lot of debate about kinds of receptors and that kind of thing, and he was studying that.

And as I recall, he came to Bob DiMarco and said, "You know, we could find other compounds that are nicotine-like that might be very useful in the pharmaceutical industries for Alzheimer and Parkinson. And there's a whole wealth of information springing up." This was late eighties, and he was right.

This has been a literal -- now they have special meetings. They had one this summer and invited some of our scientists to speak on nicotine receptors and pharmacology of them. It's a whole new ball game.

Q. When Lippiello began his work, was he looking at nicotine receptors for tobacco-related

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work or therapeutic-related work?

A. We felt like we should understand nicotine as well as anybody. So before I got here, under Bob DiMarco's watch, there had been a program to understand the chemistry and pharmacology of nicotine because a lot of accusations were being made about nicotine and we wanted to find out if they were true or not. And what better place to do it than a tobacco company.

Q. When did that begin?

A. That was his philosophy. I'd say it began somewhere around '81, '82. Seemed to me it had been going on a couple of years when I got here, the basic research. The analog activity probably started kicking in about '86, I'm guessing. And its purpose was, do any nicotine-like compounds have any therapeutic applications in neurodegenerative disease?

Q. What form does nicotine take in a natural form? Do you know?

A. Well, it can exist as an alkaloid or a salt in tobacco. Obviously if there is any nonsalt or nonalkaloid form, it would probably be volatile and not be there. I don't know that there is any, as you harvest the leaf.

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And then in smoke, it's primarily particulate with a -- what's called a semivolatile nature. And so in the smoke stream, it's well over 90 percent particulate. And it's probably -- although this is extremely difficult to measure and it's not sure the measurements used for it are precise, there's probably less than five percent of it -- vapor phase.

Q. Is there nicotine in mainstream smoke?

A. Yes.

Q. Is there nicotine in sidestream smoke?

A. Yes.

Q. How does the nicotine pass through the human body?

A. Well, it depends on what kind of tobacco product you're smoking.

Q. Cigarettes?

A. Cigar, it's oral. Oral absorption.

Q. Cigarettes?

A. Pipe, it's primarily oral. If you are a former cigarette smoker and you take up pipe or cigar and inhale it, most of it is still thought to be absorbed in the mouth and in the throat, but you might have some lung absorption if you can stand to inhale it.

Q. How about --

A. In cigarettes, most of it is thought to be

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absorbed through the lungs because of its pH.

Q. Is that --

A. That's the most popular theories.

Q. Is that in a smoke particulate phase or a vapor phase?

A. Primarily particulate. I don't -- you know, you'd have to ask one of our chemists, but to the best of my memory, last time I talked to one of our chemists about that, over 95 percent of it is in particulate phase.

Q. And what's the pH got to do with the nicotine?

A. Well, it -- you were asking me how it was handled in the body. Popular theory that's probably true is the higher the pH of the smoke, the higher the absorption of nicotine in the mouth and oral cavity and nasal pharynx area. The lower the pH, the six-one, the six-three pH area -- it's probably primarily taken up in the lower airways and alveoli of the lungs.

Q. Is there a correlation between the pH and the absorption rate of nicotine in the body?

A. I don't know of any. That's been speculated on. It's impossible to do an experiment that would duplicate what takes place regarding absorption in

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the alveoli versus the oral cavity. But we know that pipe and cigar smokers, unless they are former cigarette smokers, don't inhale. And we know they get as much blood nicotine or more than cigarette smokers. So it must be fairly efficiently absorbed in the oral mucosa for those products.

Q. Is it absorbed at the same rate?

A. I don't know, and I don't know who would know. You know, chemistry -- the fields of chemistry and pharmacology speculate and try to duplicate with different experiments what might be taking place. But duplicating the humidity, acidity of the oral mucosa or the alveoli and their lining, it's very difficult to do. You have to simulate it somehow with permeable membranes and stuff and it's not been very good work that I know of done that way.

Q. Well, when RJR published its Premier monograph, how did they represent to the world that the transfer absorption and excretion rates of nicotine in the Premier cigarette were comparable to regular cigarettes?

A. Well, we represented it as it was -- a pharmacokinetic study. You know the amount that's in the smoke. You know the amount that's in the blood and the rate at which -- that is, how many cigarettes

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and what blood level you have, and the amount that's in the urine. And from that work, I believe the monograph depicted that. If it didn't, I know publications by us later showed that it was very similar to other cigarettes, almost identical.

Now, that doesn't represent work where we measured alveolar transfer or oral transfer because we didn't. That's called pharmacokinetics in modeling. In fact, our people had a post doc from Duke University who did that work with Don deBethizy. It was very -- Don was asked, as was that post doc, to speak at a number of national meetings about that pharmacokinetics model, but it is a model.

You take the yield of the cigarette and the blood level and the urine level and you predict what happened and the events in between. And that's been published -- and presented so often that Don got sick of talking about it. It was a very popular topic.

Q. What chemicals in the cigarettes affect the absorption rate of the nicotine?

A. I don't know. I know the newspapers in recent publications speculate ammonia does, but I don't believe that's been proven.

Q. What research has Reynolds done to determine if ammonia affects the absorption rate of

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nicotine?

A. We've not done any research like that. I don't know of any work Reynolds has ever done for absorption of cigarettes with or without ammonia. There may have been some, but I'm not aware of it. I'm aware that before I got here, there was some work in the eighties looking at high levels of ammonia. I don't even know who did it. Tom Perfetti would probably know. Trying to take the cigarette and smoke it with and without high levels of ammonia and see if there was any difference in pH and in smoke.

I don't know of any human studies or animal studies or in any product that was ever being marketed with those levels in them. When you go up too high, the ammonia makes it like a cigar. The cigarette smokers don't like it.

Q. Does Reynolds use ammonia in its cigarettes?

A. Very little, but some.

Q. Where?

A. Well, we have several brands with reconstituted sheet in them. This is a tobacco sheet, as I have mentioned earlier, that you make from stems and scrap. We use about .12 to .2 levels of diammonium phosphate and ammonium salt. It makes the burn rate

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even and the integrity of that reconstituted sheet stronger so it doesn't crumble up and act like dust as opposed to a strand of tobacco.

Q. Do you use it to improve the taste?

A. Not really. There are some of my product developers that think that low a level of DAP probably makes the product taste a little better; however, I don't know that we've been able to prove that with any consumer test.

Q. Does it --

A. The same cigarette with and without DAP seems to get the same scores.

Q. Has ammonia ever been added to cigarettes for the purpose of affecting taste?

A. That work I mentioned that happened before me, perhaps in the early eighties -- the chemists that were doing those tests, I understand, tasted them. Said, "They're awful. They're harsh." You would predict they would be harsh because it would, as I said, make it like cigar smoke.

And I like cigar smoke. I like that harshness up here, but I've never smoked any cigarettes with that high a level of ammonia in them, so I don't know what they'd taste like.

Q. So to your knowledge has Reynolds ever

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used ammonia in the tobacco process for the purpose -- the intended purpose of affecting the taste of the end product cigarette?

A. We looked at some of the Eclipse and -- yeah, Eclipse earlier prototypes to see if DAP in addition to helping with keeping the substrate -- the tobacco substrate behind the heat source in Eclipse, keep it from burning. We also looked to see if that would help the taste. And the only thing we could conclude was if you keep that substrate from burning, it tasted better.

So there may have been an advantage to the taste with DAP that was a result of keeping the tobacco substrate behind the heat source from burning. That's the closest thing I know of, of any relationship between ammonia and taste. And that is using ammonia to prevent the tobacco substrate from burning and giving an off taste.

Q. The primary use of ammonia is related to facilitating the reconstituted tobacco process?

A. Yes. And -- and a cash sheet process used in Eclipse. It does the same thing there that it does for reconstituted sheet in other brands.

Q. Make it easier to work with as opposed to improving the taste?

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A. Yes. Now, there are still people who believe -- we just can't measure it -- that believe DAP makes reconstituted sheet or the substrate in Eclipse taste better. I mean it's a hypothesis, but it's never been proven.

Q. It may have that effect, but the intended use of ammonia was to facilitate the reconstituted tobacco process and handling, etcetera, burn rate?

A. No doubt about it. Both groups worked for me when it happened. Watt Dufour and company came to me to ask my permission to evaluate DAP for reconstituted shape and sheet integrity. And a few years later the group in Eclipse product development came to me with the same request for Eclipse.

And about that time, I decided to ask Davis Townsend to look at it in his program for finding cigarettes that were less ignition propense. It was a program, industry and working with the government on and trying to develop cigarettes less apt to ignite fires. And we were trying ways to find out how to make cigarettes that burn down not have high ignition propensity or even low ignition propensity.

And I had them look at DAP because it will allow something to smolder, but not ignite or flame. So flame control -- and that's the other reason we've

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looked at DAP. And unfortunately, at levels it takes to keep it from every -- ever igniting a little couch. They call them mouse couches -- are just like ammonia would be in other forms. Makes the cigarette so harsh that nobody would smoke it. But we sure took a hard try at it because we thought we were on to something.

Q. Could you describe for me the reconstituted tobacco process?

A. Well, it's been a while since I've been over there because that facility is off campus across the road, but I'll do the best I can from my memory. The stems and scraps are brought into a fluid stream with water and homogenized. And they go across these special mats that help flatten it out like a paper. And they make circular -- on this map, they adhere to it. And one of the things that the pectin that's naturally in tobacco and DAP help do, as I understand it, is get it to cling.

And it goes through a circular motion, a long belt and water is put on it and recirculated and put on it to make -- to, using my terms, to slush it and then refilm it, slush it and refilm it -- water recycling. And obviously you use water solubles by that, but at the same time you provide a tobacco

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material that's a taste-neutral, but allows the cigarettes to have less tar, less biological activity and less chemistry that's of concern.

So it's a mechanism for using tobacco scrap that also has benefits on lowering tar and lowering constituents of concern. You also lose some water solubles like nicotine when you do it.

Q. This mat that turns, is it a drum that rotates?

A. Well, it's like a long conveyer belt that's sort of in a half-drum or trough-like area. And as the film of tobacco slush and varying levels of moisture as it goes down -- goes across it, it flattens it more and make it thinner. But the DAP and the pectin in tobacco and the gradual drying and unhydrating, if you will -- dehydrating is done through a series of cycles such that the last cycle is dried out in a drum -- to your point about a drum. And you have something that's not too different from this paper here, but it's made of tobacco.

Q. The whole sheet is tobacco? There's not an unnatural paper product as part of that sheet?

A. Well, there --

Q. When I say "unnatural," there's not --

A. Tobacco stems are in there. You can use a

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little bit of paper pulp like in that paper. Cellulose -- cellulosics would be a better word and --

Q. But is the drum itself, is the drum coated with anything? The conveyer belt coated with anything that the water solubles that it's going through stick to? Or is it just the stems and the small particles of tobacco with possibly some pulp?

A. Well, if you want to and you choose to, you can case that G-7. You can put sugar or top-dressing on it. You can do that with a number of processes like cash sheet, G-7 which is reconstituted sheet. We have something that's called cut-roll-stem process. You can do it there. You can insert in the process flavors, if you want to.

Q. I'm not talking about flavors, per se, or additives. I'm talking about -- I'm trying to get a concept of this sheet that comes out.

A. Okay.

Q. Is it pure tobacco stems and small particles of tobacco?

A. Primarily.

Q. Or is it coating some piece of paper, cellulose or something else?

A. It may have some cellulosic material mixed in

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with it, wood-like cellulose. I just don't know if we have any of that or not.

Q. And this --

A. We've looked at it for decreasing biological activity.

Q. Is this --

A. But that -- go ahead.

Q. I'm sorry. Is this process called G-7?

A. Yeah.

Q. What's the "G" stand for?

A. Beats me. We use the -- "G" is a term used here as an acronym at Reynolds for a lot of processes. Most of our manufacturing process have "G" in front of them -- G-14, G-19, G-17, G-13 and that kind of stuff.

Q. Is there only one reconstituted tobacco process. G-7?

A. One primary one. You can put some flavors on it, or casing as it probably ought to be called, for some brands and not others.

Q. Do any --

A. But what you do is you use the same facility. We've got two of them and they're designed the same way -- 181 and one other one. And if you have a different brand, you can change the recipe of G-7 a

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little bit for different brands for taste.

Q. Okay. The casings and flavorants, do they ever include nicotine?

A. Not to my knowledge. Not to my knowledge. Now, that process -- that product I was telling you about earlier that we looked at because of public health officials, there you can take the water solubles of tobacco in G-7 and let them reapply and not lose them to get that maintained nicotine, but low tar. So theoretically -- we've never done that commercially -- theoretically, you could do that with G-7.

Q. The G-7 -- now, is that 181?

A. Yes.

Q. What's the other one?

A. I forget the name of the other manufacturing facility. I don't know if it's Shed 9 or what. I forget what it's called.

Q. How are they different?

A. One of them is a larger scale than the other one. 181 is where most of the research work is done if you try to make a better tasting cigarette.

Q. The process itself where the conveyer belt runs through, is there ever a period of time in that process where the product sits and dries out and

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then is run through other solubles or sprayed with other solubles?

A. Not that I know of. We've looked experimentally at whole blend casing. We haven't used it. See if we can make the entire blend taste better with casing, but we haven't made much inroads. Just casing the burley or casing the G-7 alone does just as good.

Q. Now, you said the G-7 was used in some brands? Which brands?

A. Most of our -- Dural and most of our savings segment. I don't think it's used in Winston. Little is used in Camels, but the rest of the brands, I don't know what the breakdown is.

Q. You don't think any G-7 is used in Winston cigarettes?

A. I can't recall if -- let me think a moment. G-7 is used in -- it's G-13 and G-19 that's not used. Expanded tobacco is not used in Winston. G-7 is. Had to sit here and think about it.

Q. Isn't reconstituted tobacco used in every cigarette that Reynolds makes?

A. Most of them, but I don't know for sure that all of them are that way.

Q. Aren't there different levels of nicotine

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in the reconstituted tobacco sheets?

A. I think they are all very close to the same. If you take -- and we have for Eclipse. If you take regular leaf and use it in a reconstituted sheet, you'll have -- because there's more leaf there, you'll have a higher level of nicotine.

Q. I understand that. But if I'm over in, let's say, products specifications, if there is such a building. I call up to the G-7?

A. There's a group and they work for me in R & D.

Q. I call up to the G-7 group and I say, "I want some G-7 for a cigarette I'm making with a range of nicotine in the following range." You're telling me that they couldn't get that?

A. If they could get it, we'd have to set up some special procedure for it. And again, going back as I said earlier, it would primarily be the result of not letting that water getting away that I was talking about recycling. So you could -- if you could not let the water drain away, let it reapply more, you possibly could get nicotines a little higher in that G-7. You just try to figure out how not to lose it.

But we don't do that to my knowledge. We don't -- our specs on G-7 are the amount of stem, cellulosics, DAP and in some cases, flavors. We

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don't spec G-7 by nicotine to my knowledge.

Q. Why is there different levels of DAP?

A. Well, if you use more stems and less scrap -- your tobacco scrap, you're going to -- you may have to use like .2 levels of DAP to get that to stick together better as opposed to .12. You could have to go up a little bit in your DAP to help the strandlike properties be there.

Q. Is the pH of the reconstituted sheets a specification?

A. It may be, but I don't know that they are. Not that I know of, but it's possible. Of a sheet that's unsmoked, I don't think so, but it's possible.

Q. Didn't you testify earlier that the ammonia affects the pH?

A. What I said is the levels you -- yes, that if you use high levels of ammonia, you can affect the pH, yes.

Q. Well, isn't there a relationship between the level of ammonia and the level of pH?

A. You have to use -- before you can affect pH, as I understand it from the chemists, you have to use two to four percent and probably closer to four percent ammonia to get there, before you'd have any significant impact on pH. And you can move that --

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according to that article out of the West Coast, out of Oregon I believe it was that CNN had -- we got the article and looked at it. He got that pH up of that condensate to well over eight. That's pretty rough.

Q. And is it your testimony that ammonia or -- what was the other one? Di --

A. Diammonium phosphate --

Q. Diammonium phosphate?

A. -- which is ammonia salt, phosphate salt.

Q. Is it fair to use ammonia instead of diammonium phosphate? Do you understand what I'm saying?

A. I do. I would prefer -- we don't use gaseous ammonia.

Q. Okay.

A. We use DAP, so it could lead to misunderstanding my answers.

Q. Is it your testimony that Reynolds does not use diammonium phosphate for anything related to affecting the pH in tobacco smoke?

A. Yes, it is.

Q. Is it your testimony that Reynolds does not use diammonium phosphate for any purpose related to affecting either the nicotine yield or the transfer rates of nicotine?

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A. That's true.

Q. And you're absolutely certain about that?

A. As far as I know. I can only testify as to what I know. We had a process years ago where we took nicotine out of tobacco. It was called KDN. When we get burley crops in -- like I said this morning, different types of tobacco can be extremely high in nicotine compared to another -- it could be like four percent nicotine in burley leaf when it's usually around three.

And we used to have this process called KDN where we would use ammonia to take nicotine out of the leaf because it was too high. But we found out how to do that with better purchase of leaf and blending, and we got rid of that process. We mothballed it.

Q. When did Reynolds stopped using the de-nic process?

A. Probably around '87 or '88. And we used it very little then. I'm guessing but somewhere in that vicinity. We kept that tunnel, that KDN tunnel as we called it, to look at that low TN cigarette that I told you about earlier when we tried to look at organic acids like levulinic acid to see if we could get the less than ten-to-one TN cigarette, the tar to

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nicotine ratio. Since many critics of the industry were saying we ought to do that, we took a run at it.

There was a product came out called Rotheman's Specials in the late eighties that apparently Rothemans over in Europe did. And it had less than ten to one tar to nic ratio. We tried it and it was really harsh, like a cigar sort of. Not quite as bad, but almost. And I'm not a cigarette smoker, but those that I watched try it would cough because it was so harsh.

And so we were aware of and been reviewing the literature from the Froggatt and Hunter Committee, which now is SCOH Committee -- Scientific Committee on Smoking and Health in England. And they kept saying you need to get the TN ratio below ten.

So we thought, "How might we do that?" And that's when we took that KDS facility and looked at could it help us make tobacco that would have maintained nicotine and not lose the nicotine in the G-7 process. And that was the last use of that tunnel. And that went away in the early nineties because of the after-taste problems that I spoke about earlier of levulinic acid.

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Q. Is the -- in the reconstituted tobacco process, are there -- is it your testimony that there

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are not specific reconstituted tobacco sheets that are made with specific nicotine levels?

A. They are not made with those as a spec to my knowledge. We might be able to predict about what they are. The reconstituted sheet tends to run at one-and-a-half percent level less nicotine than leaf does. So I think there are folks who could estimate what that would be, but we don't measure it or spec it.

Q. Well, after it's --

A. To my knowledge, we don't.

Q. After it's manufactured, do you measure the reconstituted sheet before it goes into the cigarette?

A. Not to my knowledge. They may, but I'm not aware of it. I don't believe we do. The only time there may be an exception is like that Day One report back in early '94 or whenever it was, late '93, early '94 -- ABC News. They claimed we had higher than expected nicotine in our reconstituted sheet. I suspect we went back and measured our G-7s to see if they were -- is there any way they were right? We did and it was lower than they reported. They had some work from the American Health Foundation.

So I had my guys -- okay, we know reconstituted

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sheet has one or one and a half percent nicotine and we know leaf has two and a half, three percent nicotine so what's going on? And the theory was that when a cigarette is made, nicotine equalizes in the blend and migrates to the reconstituted sheet. So we looked at some G-7 when it was first made and then tore some cigarettes apart and looked at the G-7. And it goes up some -- not much, but some.

So there is some migration of nicotine from blend to reconstituted sheet. Still not as much as they reported. And I think they came out later and said that that television program reported a higher level than what they told them, so I don't know what happened.

Q. And is it your testimony that the individual calling up from product specifications could just say, "I want 'X' amount of G-7. I don't care what type of G-7 it is." There's one type of G-7 insofar as nicotine is concerned?

A. Whatever variety our different G-7s are, they are not based on nicotine level. They are based on the constituents of the solids and whether or not they have any top-dressing or casing.

Q. Okay. There --

A. There is -- to finish -- there's a possibility

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there are slight differences in nicotine. They're not in spec and I'm not aware of them. It's possible. I don't -- depends on what kind of solids you make them out of. If you have more burley scrap, you might have slightly higher nicotine.

We don't spec for that. We don't target it. We just don't target nicotine. I mean it goes with the tar, as I said earlier.

Q. Don't target and you don't control it?

A. No, we can estimate as I've said before. We can estimate about where it comes out.

Q. But you don't control it?

A. Not to my knowledge. I don't know how we would.

Q. Now, you said that the biggest effect or factor in the nicotine content would be the underlying constituents used, the solids and top-dressings.

A. Solids, primarily. What leaf did you use to make it?

Q. Does the top -- do the top-dressings affect the nicotine levels?

A. No.

Q. What do you mean --

A. What I was saying was any specs that occur for

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G-7 are based on the solids, the tobacco in it, the stem in it, the cellulose in it and the top-dressing. Not nicotine.

Q. What are --

A. No nicotine comes from top-dressing in any G-7 or any cash sheet that we produce.

Q. What's top-dressings?

A. It's sugars, some flavors.

Q. Have you done any research to see if the sugars or flavors or other top-dressings affect the nicotine yield or transfer rates of the nicotine?

A. No, only one that I'm aware of that we ever looked at. And this product out in Oklahoma City that I mentioned earlier, it has a proprietary salt in it. And the -- why we were working on that product because we were trying to make a low nitrogen blend, so many of the carcinogens would be reduced in that cigarette. And irritants would be reduced. We used what was called low-nitrogen blend. In that process of that blend, we used a salt that gave a burley taste because there was no burley tobacco in it.

One of my scientists came to me and wanted to use that salt for a burley note. What he called a "dirty sock note," a bitter note. And I said, "Well,

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I don't mind you looking at it in product development."

Several months later the Wall Street Journal came out with an article accusing U.S. Tobacco -- a smokeless tobacco company of using potassium salts to manipulate nicotine. So we got -- Dr. Suber and I got to talking about, "Well, you know, we're using this for a burley taste. They're going to accuse us of manipulating nicotine if they come at us like they did U.S. Tobacco, so we need to do some research."

So we looked at this blend with this salt in it and we found that it created less nicotine in the blend and the smoke yield, not more. And that didn't seem sensible to us. And we went back and did some work treating the tobacco with the salt. And we found a little bit of tobacco gets -- is in the head space or the chemist's lab where they have these little chambers that they do this work in, glass chambers. In the so-called head space, the air above the tobacco, there was some nicotine there.

So that -- we got a little concerned about it and I said, "That's wonderful news." Because what that means is while you make the cigarette, the tobacco is gone. It's not in the cigarette when you get it. Because I didn't want a cigarette that

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tastes like a cigar.

Q. You don't mean the tobacco is gone?

A. No, it reduces a little the yield -- not a lot -- of nicotine in it.

Q. You said, "The tobacco is gone." Did you mean the nicotine?

A. I meant the nicotine is gone. If I said tobacco, I meant the nicotine. It's gone from the tobacco. The tobacco is not gone. It's gone from the tobacco. Somewhat decreased. The nicotine is still there.

We also did a blood level of that product of nicotine because about that time, Dr. Kessler was accusing the industry -- Reynolds and everyone else -- of using salts and ammonia to manipulate nicotine or the blood levels of nicotine. So we thought, "Well, we better find out." We know that we reduced the smoke yield of nicotine a little. We reduced the amount of nicotine in the green, quote-unquote, "unsmoked tobacco" a little, but what happens in the smoker?

So we ran this study and we found the blood levels were slightly lower, but not enough to be statistically significant. They were not higher. They were lower, but not enough to be statistically

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significant. Back to the statistics we talked about earlier today.

Q. What --

A. So we were quite relieved that this salt that gives a burley note is not an enhancer of nicotine either in yield or absorption. That's the only case I know of where we've looked at an ingredient to see what its effects are on nicotine.

Q. Are you comfortable if I use the phrase "yield of nicotine," that I'm referring to the FTC testing methods?

A. Yes.

Q. Are you comfortable if I use the phrase "transfer," that it's once it goes through the body and how it's metabolized?

A. No, I'm not comfortable with that because to a lot of people, "transfer" means how much is transferred into the blood from the airways. I would prefer "absorption" as a term there.

Q. Absorption for the process of how it's metabolized?

A. For how it's taken up in the body before it's metabolized.

Q. How about for transfer? What does that mean to you?

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A. Well, transfer means what is the rate from smoke into the bloodstream of nicotine, if we're talking about nicotine transfer. That gets back to the problems we talked about earlier -- I talked about earlier.

You just can't reproduce the exact environment of an alveoli. And you can't tell how the nicotine and other -- other gas components are leaving a smoke particle, either in the mouth or the lung. You can't simulate that. You can only calculate what it might be from the blood levels and the urine levels.

Q. Okay. So you're comfortable if I -- when I use the word "transfer," that you understand it's the rate at which the smoke is taken up through the bloodstream?

A. That would be acceptable.

Q. And if I use absorption, you're talking about the rate at which it is transferred through the body as a whole?

A. The rate it's -- "transfer" would be how it leaves the smoke to be available to the body. Absorption is what the body does to take it up.

Q. And excretion is --

A. After it's been metabolized by the liver and kidney, it's urinated. Most of the nicotine goes out

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through the urine -- at least that's what the pharmacology books say.

Q. From '84 to the present, what research has Reynolds done to determine the absorption rates of nicotine?

A. Very -- I mean other than what I just described to you, nothing. We obviously -- when we make a cigarette like Premier or Eclipse, we want to make sure we understand how similar or dissimilar that is, blood levels and urinary levels, to other cigarettes.

Q. What research has Reynolds done since '84 to determine the transfer rate of nicotine?

A. None per se. I told you I understood there was some work in the early eighties where ammonia was blasted onto cigarettes to see what effect it had on pH, many levels of it.

Q. And that has --

A. That is -- that is not a transfer study. That's a chemistry study -- a chemistry transfer study, if you will, just to see. Everybody was talking about the importance of pH and our chemists and product scientists were trying to figure out if there was any importance there or not.

And what they found out is, yeah, it's important if you want to make a cigarette act like a

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cigar. And they found out by having the expert smokers and themselves try what they had, that it was very repulsive in taste.

Q. The cigarette that you referred to in Oklahoma, was that Eclipse?

A. No, that was a Winston Select test market product, lights and full flavor. And I think it's still there.

Q. How is it different than some other products you saw?

A. It's a low-nitrogen blend. That means it has very little or no burley in it. The full flavor may have just a small amount of burley in it. I think it has a small amount. The lights has no burley. And therefore, burley which has the highest nitrogens of the tobaccos -- therefore, the blend is a low-nitrogen blend. It has either no burley or so little that it's not contributing much nitrogen.

That means that certain carcinogens should be lower. And that means that a lot of the irritants, the carbonyls and other -- I mean the free radicals that are irritants. Carbonyls are down somewhat, too, but the free radicals are especially down.

The literature and the scientists in the industry and outside of the industry seem to have a

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new carcinogen a decade that it's important. And free radicals, oxides of nitrogen and precursors like 1-3-butadyene and isoprene are known to generate free radicals.

We had been working with a free radical expert off and on over the years by the name of Jim Pryor at LSU. Excuse me -- Bill Pryor. And he has some theories and we've been working with him on them. And in that blend in Oklahoma, because of the kind of tobacco we use which provides less oxides of nitrogen and the carbon filter we use, free radicals are decreased 70 to 80 percent. It's thought to be important in heart disease. It's thought to be important in cancer. So that low-nitrogen blend helps provide less precursors of free radicals and what free radicals are generated during smoking are taken -- efficiently taken out by that carbon filter.

Q. And the work you said that was done in the early eighties to determine the affect of ammonia on the pH to your knowledge has not been repeated?

A. Not to my knowledge. You see, a lot of the speculation now and then, our chemists found absurd. They don't make sense. And their attitude was you've got to use such high levels of ammonia or ammonia salts or acids, that you would make the cigarette gag

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a goat it would taste so bad -- to use one of the guy's phrases.

And so they did that work to prove it and to prove how much you'd have to use to change pH at all. But it's problematic because any good chemist will tell you smoke pH is hard to precisely measure. Much of what you measure is an artifact of a smoke collection. So it will drive a biologist like myself nuts to listen to these chemists talk.

Something comes out like it did three or four weeks ago, that guy on the West Coast. My chemists go nuts because they know cigarettes very well and smoke chemistry, and it just drives them crazy. So they'll go out and they'll do an experiment to prove, "Hey, you can't do this unless you run the pH -- use four percent ammonia and run the pH up to the eight area. And then you got a cigar that no self-respecting cigarette smoker would smoke.

And then they turn right around and tell you, "Although, you know, you got to understand pH measurement is difficult. You can measure in the ballpark. It's adequate, but it's not precise." So it's like a convoluted issue. It's a simple question, but a complicated answer.

Q. This article you're referring to from the

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West Coast, I'll mark Exhibit 2.

(PLAINTIFF'S EXHIBIT 2 MARKED FOR IDENTIFICATION.)

Q. Is this the article you're referring to?

A. Yeah, that looks like it. Sure does.

Q. And you don't believe anything in that article?

A. No, I didn't say that. If you -- if you take the levels that this guy used -- now, he used it as it turns out on collected smoke, which is mainly the condensate part. You can get the effect that he got. But you'd run the pH up to eight-plus and have a pretty bad-tasting cigarette.

Now, the other assumptions in this article -- and it's been a while since I read it. Probably three weeks.

Q. What's the title?

A. "Conversion of Nicotine in Tobacco Smoke to Its Volatile and Available Free-Base Form Through the Action of Gaseous Ammonia." If you -- as you've heard me say, we don't use gaseous ammonia. But if you took whole smoke or condensate -- and his turns out to be the particulate part of the smoke. And you hit it hard with ammonia gas, you can get an increase in vapor or volatile nicotine. The assumption is, is that it somehow or another is absorbed more readily

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or more accurately. And nobody knows if vapor nicotine is any more efficiently absorbed than is particulate. But even if it were --

Q. Nobody knows that?

A. No. Boy, if they have, they haven't published it.

Q. If anybody offered the opinion that vapor nicotine was absorbed more readily than particulate nicotine, would you say they were -- didn't know what they were talking about?

A. I'd say that it's a logical assumption, but what's your evidence? You see both using traditional cigarette research, papers that are published, I don't think one is any more readily absorbed than the other.

I mean 95 percent or more of the nicotine that's inhaled in cigarette smoke is absorbed. So if vapor phase -- if you hit them with straight vapor phase nicotine, like a person -- if you had them breathe vapor nicotine from a gas mask -- it's hard for me to believe it's going to be much faster absorbed than smoke nicotine, which is mostly particulate. But even if it were, you'd have a cigar.

If you move the volatile nicotine levels up,

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you in essence are moving a smoke pH and the taste of the smoke to that of a cigar. So if the accusations in the press is that that's a free-basing form of nicotine, then cigar smokers must be free-basing nicotine. Because they smoke probably the most basic smoke of all, the most high pH of all, the highest alkaloid smoke of all.

Q. Does your same opinion apply with respect to the transfer rate? That is that you couldn't be convinced that there's a higher transfer rate with vapor phase versus particulate phase?

A. If someone were to publish an article where they looked at -- they artificially design an exposure of people or animals, where the only thing they shot down into the lungs of an animal was vapor phase nicotine -- or a person. And then in other case, it's only particulate, they're going to have to have in that experiment some measurement that measures milliseconds of changing blood levels of nicotine. I don't know of any such work that's been done. This certainly wasn't it. And I don't know how you would do it.

Because you would have to get as the pulmonary capillaries and arteries are leaving the lung, going to the heart from the right side of the heart to the

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lung to the left side, you're going to have to take that measurement before it gets diluted on the left side of the heart by all the other blood coming back to it to prove that the level of nicotine is different between different levels of volatile or vapor phase nicotine.

Free-base -- that calling volatile nicotine free nicotine or free-base nicotine, I think is very sloppy scientific language. That conjures up cocaine, crack users and stuff free-basing as they call it.

Q. Well, is there such a thing as free nicotine?

A. Yeah. And as I told you before, it's very low levels. Most -- well over 95 percent, I believe. Definitely well over 90 percent of nicotine in smoke is particulate form. Now, again, I'm not a chemist, but this has been an issue of great interest to us here because of all the accusations made to us including this last one here.

Q. Can you imagine --

A. Now, we don't use gaseous ammonia, so you could argue why do we care. Well, we care because it's bad science. I don't know what the other companies are doing and I don't care, but I got to tell you -- if

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you use this, you're making cigars from cigarettes.

And they -- people -- so let's say, okay, you've got some free nicotine. You've increased it. You're not going to inhale it down into the lungs. You can't stand it. So to argue that the capillary bed of the lungs sucks up more nicotine quicker and more readily, that might -- okay, let's use that argument, but you're going to inhale much less of it down to the lungs.

So you've got a law of diminishing returns. You've got less nicotine in the free form getting into the deep lung. And you have more nicotine in the free form up here in the oral cavity (Indicating.) So you've got a cigar and you've got a situation like a cigar smoke. Not some sort of insidious plot by Reynolds or anybody else to make crack nicotine.

Q. Has the role that nicotine plays in a person's desire to smoke been studied by Reynolds?

A. Not really. We -- when a competitor came out with a cigarette called Next -- and I forget when that was, but seems to me it was around '89 or '90, somewhere around there, but I really don't recall. We watched with a great interest their test market. That was Philip Morris.

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Because we believed that smokers wouldn't like it because nicotine is important to the taste and other benefits that smokers say they get from cigarettes like relaxation or increased alertness, that sort of thing. So we watched this with great interest.

And we had our own form of de-nic process. We had that KDN that I was telling you about. And we also had some of our engineers, we asked them to build a high pressure extraction process. And they went to Rohm & Haus and some other places, built this little lab-top unit we called Rest, and we made tobacco that was pretty free of nicotine from that.

And we made some cigarettes out of it and we asked our -- the SED panel and our expert panels to smoke them, our employees who were expert smokers -- and they didn't like them. So we watched the Rest process with great -- I mean the Next market, test market with great interest and were not surprised when it bombed.

And last, but not least, Dr. Bob DiMarco and me and Wally Hayes strongly felt that was the wrong direction to go. Because you're building a cigarette that doesn't have the nicotine, which is important for taste and satisfaction, but it has all the tar

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and toxins. And if you're going to change the proportion of smoke components like nicotine and taste like some of the organoleptics, it should be to increase them in terms of their acceptance, not decrease them such that all the smoker is getting is tar and the toxins in tar.

So we also had -- even if they had taken off, I predict -- Next had then taken off -- we would have argued very strongly in R & D, and I think successfully, that we shouldn't do that. What we were looking at, though, with that Rest process is would it be a better way to get rid of higher nicotine blends than that KDN process? Would there be the lowest acceptable nicotine yield you could find -- smoke yield -- and would Rest be the best way to do it? We don't want any more nicotine than we need in cigarettes for taste, satisfaction.

Q. What do you mean by satisfaction?

A. Well, we do a lot of consumer research. And part of satisfaction --

MR. MAISTROS: Excuse me.

THE WITNESS: Sure, I'll wait.

(PAUSE.)

Q. Okay, I'm sorry.

A. That's fine. We ask smokers when we do test --

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we have what's call a single stick test and we have pack tests and we have carton tests. We often ask them, "Did you find this cigarette satisfying?" And that's a combination of mouth feel and some smokers will tell nasal sting when they exhale the smoke and taste. And we know nicotine is important for taste, mouth feel, nasal sting, probably even for after taste.

So when we ask that question about satisfaction, it means the overall taste and other things like mouth feel. Some smokers talk about chest and throat feel. They like a -- I hate to use the word sting, but some of them say sting. Others say tingle and others say sensation. That's -- I know smokers who say they want a good chest feel. I know other smokers say they want a good throat feel. That's part of satisfaction.

Nicotine is probably important for that. I say probably because for the same reason you can't design a study to prove the rate of transfer or rate of absorption in the alveoli is the way you can't prove what role nicotine plays in chest and throat feel.

Q. Okay. So back to my original question, has Reynolds done studies or research to determine the role that nicotine plays in a smoker's decision

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to smoke or continue smoking?

A. No, other than that question we ask them on occasion. "Is this satisfying? How is the mouth feel and how is the after-taste and how's the taste? Other than that, no. We never marketed or tested seriously any de-nic product. We only did very subtle tests on that and we found it was unacceptable. But how much can be there and move it from unacceptable to acceptable, we never did that work.

Q. Has Reynolds done work to determine the minimum level of nicotine that would be in a cigarette in order to make it acceptable?

A. Some. For example, in Premier and Eclipse when we developed those, we knew they had to have a certain yield of nicotine before the smokers said it was acceptable.

Q. Well, wouldn't that be a study to determine the role nicotine played in a smoker's decision to continue smoking?

A. No, because it -- it sounds like it. Certainly I can see why you ask that question. But cigarettes that heat tobacco have -- depend -- it appears they depend more on the gas phase of smoke than the particulate phase for taste. And the reason I say

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that is the fraction -- the tar, the particulate is more reduced, both qualitatively and quantitatively in Eclipse and Premier than the gas phase is. The gas phase is reduced, too.

Well, Eclipse has a lot better taste acceptance than Premier and it has some greater gas component than Premier did in terms of GC peaks. We're trying to decide what gas phase components are important for taste. We continue to do research on that because I believe this thing, organoleptic can port for taste. Nicotine's one of them, but it isn't the only one.

I believe some of the organo -- organic acids are important. I think some of the chlorogenic acid family, which by the way is also an anti-carcinogen -- I think some of the -- those acids are important for taste. They are in coffee, it's claimed, and tea. And I think they are in tobacco and we are trying to look at that.

That would be great news because they are not carcinogens or cytotoxins. In fact, they are anticarcinogens, so I hope we find something out there.

But we know that if you get Eclipse or Premier too low in nicotine and it's lower than other products, you'll get negative -- you'll get bad

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scores for it in consumer tests and that's not unlike Now. We have an ultra low product called Now. The lower we make the nicotine and the tar in Now, the less acceptable consumers find it so it makes sense.

Q. When you say there's none -- been none -- no research done per se to look at the role nicotine plays in a smoker's decision to continue smoking, are you including in there, there's been no biological research?

A. To determine the role nicotine plays in biology?

Q. The role nicotine plays in a smoker's decision to continue smoking?

A. We haven't done that work. Not since I've been here, if ever. If they don't buy it, you don't sell it. And if Next made by Philip Morris, or our consumer test when we have the levels of nicotine and other gas phase components too low in Premier and Eclipse, it won't sell because they don't like it and won't buy it.

That's our only interest. We don't have any other interests. Do the consumers like it? Do they think it tastes good? Do they think it has enough mouth sensation? Nicotine is important for that. Some other gas components are important for that. We

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are trying to find out what they are. We don't know yet. That's all we care.

Q. Has Reynolds done research to determine if there's nicotinic receptors in the brain or the central nervous system?

A. Well, Pat Lippiello, whom I discussed earlier, was trying to understand the role of nicotine in its pharmacology and physiology. And he has looked at nicotine receptors. He's considered a world renowned expert on nicotine receptors. I don't know how many classes there are, but he's known all of them and demonstrated all of them. And he's presented often in England and Europe and Asia and places like this. He's done some work to understand what the receptors in the CNS are of nicotine. And as a result of that, he lead the research direction for these analogs for therapeutic use.

Q. When Mr. Lippiello began, which was when?

A. Dr. Lippiello.

Q. When Dr. Lippiello began --

A. It preceded me here, the work he was doing. Because as a veterinarian, when I got here -- and someone who had experience in lab animal procedures, I looked at his animal rooms and his set-up to make sure they met federal requirements.

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Q. Wasn't his program developed for the specific purpose of understanding how nicotine interacts with the central nervous system?

A. Specifically how nicotine interacts with neurons, certain kinds of neurons.

Q. When it was originally established, it was not to figure out if nicotine could be used as a cure for Alzheimer or some other therapeutic purpose?

A. That's correct. As I've said originally -- earlier, his job and a few of his colleagues was to understand everything they could about the physiology and pharmacology of nicotine. In the midst of doing that job and understanding nicotine, he got into the study of receptors.

After a few years of experience with that and the literature started talking about the decreased incidence of Alzheimer, Parkinson and other neurodegenerative diseases in smokers, he felt like his nicotine receptor work verified speculation in the literature and we ought to be able to find some nicotinics that don't have the vasal constriction and other properties of nicotine.

Q. Okay. That --

A. To use for therapeutic use.

Q. -- is a different aspect. I want to go

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back to when he was set up. Early on his work was focused on understanding how nicotine interacts with the central nervous system, was it not?

A. It was, once again, to understand how nicotine interacts with neural cell cultures. He used cell cultures or embryonal-derived rat cells to look at nicotine on the cell surface and the receptors. That's what he was doing, as I understand it, before I got here.

Q. And he was doing work. Are you confused by my use of the word "central nervous system"?

A. Yeah, because he didn't use the intact central nervous system. He used cells derived from the central nervous system.

So what he looked at -- because I'm very cautious, try to be. Sometimes I'm not as much as I should be. You have to look at an intact organ if you're going to call it a system study. If you look at some of the cells but not all of the cells from that organ, you're looking at a cellular study. That's why I'm careful with the words I use.

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Q. So his title of his paper should have been an analysis of nicotine's effects on cells as opposed to central nervous system, that he published?

A. I don't know what the title of his paper was.

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You'd have to ask him.

Q. Okay. Isn't it fair to say that the goal of his original work was to better understand the role nicotine played in the smoking process?

A. His goal as I understood it -- you can ask him -- was to understand the role of nicotine, its physiology and pharmacology. As you've stated, one of his papers -- there may have been a paper he published. He did do some work with frozen sections from brains, intact brains. So he may have published a paper on that. I don't know.

Q. And --

A. If he did, I didn't get involved in it. He didn't work with me when I came here.

Q. Do you know if one of the overall purposes of his research and his projects was to increase the sale of cigarettes?

A. No.

Q. Do you know if one of the overall purposes of his research and projects when it commenced was to reduce the decline in the sale of cigarettes?

A. Not to my knowledge.

Q. Do you know if the role and purpose of his project when it commenced was to reduce the

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decline in the social acceptability of smoking?
A. If the role of his research was to decrease the decline of social -- no. You know, that started before me. And when I got here and asked him what he was doing -- because I had to start up an animal care committee, I had to know why he was doing his work. I'm just reciting to you what he told me he was doing. Understanding the pharmacology and physiology of nicotine.

Most of his work, with the exception I just gave you a while ago, was on cells derived from the central nervous system, but not intact central nervous system. Some of his work I recall was done on thick brain sections, which he could have been written a paper on the CNS system from that work. His -- when I asked him what's the purpose of this work, what he told me was to understand the pharmacology and physiology of nicotine.

Q. Why is that?
A. I asked him -- just so I can help with your discovery process here. I asked him at the time, "Why?" And he said, "Well, Bob DiMarco and I agree that we ought to understand nicotine because we're a tobacco company better than anybody else."

Then I asked him, "Are you looking for a

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substitute for nicotine in tobacco?" And he said, "No. Obviously if we could find something that's already in tobacco that has less negative ramifications than nicotine, that would be wonderful, but that's not the purpose of this work."

THE VIDEOGRAPHER: Mr. Maistros, we have five minutes left on the videotape.

Q. Haven't nicotine analogs been discovered, produced, manufactured for decades?

A. Perhaps, I don't know. Obviously in the leaf of tobacco, tomatoes, peppers, eggplants, solanaceous nitrate family, there is alkaloids of the nicotine family and those have been known for a long time. You've got matanicotine --

Q. Haven't there been laboratories for over a decade that would sell nicotine analogs if you picked up the phone and called them?

A. There have been chemical supply laboratories who cater to chemists who could -- who could sell you nicotine, metabolites of nicotine in tobacco and/or other compounds that have nicotinic properties. But there's not very many places that you could get what I would call the kind of nicotine analogs we research, if any.

And we have patents on these. They are in the

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literature, patent literature. We discovered them. We have the rights to them and we hope that a pharmaceutical company will use them for therapeutic benefit.

Q. What's the single largest percentage of particulate matter in the tar phase of tobacco smoke?

A. What's the single --

Q. Largest compound in terms of percentage that's in the tar phase of tobacco smoke?

A. I don't know. It might be nicotine. It might be acid aldehyde, I don't know. I said aldehyde. I don't know the answer to that. Those are among the largest, but I don't know -- by weight, but I don't know what the largest single compounds are in terms of amount.

MR. MAISTROS: We have to change the tape, okay?

THE VIDEOGRAPHER: We're going off the record at 2:29 p.m..

(RECESS TAKEN FROM 2:29 P.M. TO 2:41 P.M.)

THE VIDEOGRAPHER: This is tape three of the videotaped deposition of Gary Burger, Ph.D.. We're going back on the record at 2:41 p.m..

BY MR. MAISTROS:

Q. I want to make sure we're not missing

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each other in the night with my question of the role nicotine plays in someone's decision to continue smoking or in the smoking process, okay?

Is it your testimony that from 1984 to the present, to your knowledge, Reynolds did not undertake any research for the specific purpose of understanding the role nicotine played in the smoking process?

A. I cannot think of any in terms of, you know, what you're asking. We already knew and continued to understand that nicotine is important for taste and for mouth feel and other things of importance to smokers. We didn't do any research around how much nicotine is important for that kind of stuff. We know if it's in a certain window for a tar category --

Q. Okay.

A. -- you're fine.

Q. You're familiar in '88, the surgeon general issued a report that suggested nicotine was addictive?

A. Yes.

Q. It might be '89. I have so many dates in my head.

A. I believe it was '88, somewhere in there.

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Q. In any event, the short-form version of the surgeon general's report was nicotine is addictive. Are you aware of that?

A. Yes.

Q. Since 1988, what research has Reynolds done to determine if the surgeon general was correct?

A. I don't know of research that proves or disproves addiction. I know that Reynolds' scientists have published articles debating whether nicotine is addictive or habituating. John Reynolds, Wally Pritchard -- I mean John Robinson, Wally Pritchard, those people. Any work that was done in-house or out of house that proves it is or is not addictive, I'm not aware of.

Q. Let's get beyond concluding that it is or is not. Are you aware of any research that Reynolds has undertaken in-house or out of house to in any way utilize to either criticize or confirm the surgeon general's '88 findings?

A. I'm vaguely aware of some work that was done over at Bowman Gray to -- funded by us to compare nicotine to caffeine, cocaine and other drugs of abuse. In addition to cocaine, I don't know what the other drugs were.

Q. Bowman Gray Medical School?

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A. Yes. And that work was published, presented and published.

Q. Any other research funded by Reynolds?

A. I believe Dr. Wally Pritchard had some work that he published talking about the profiling of the brain by electronic fields and how nicotine is like caffeine and others. I believe there was some work done there. He didn't work for me, but I vaguely recall some work there where you look at EEG's, brain patterns, electrical patterns. He's got quite a sophisticated instrument.

The only other work I'm aware of was some work done in-house and some over at Bowman Gray on task performance and what nicotine does with that and the contrasts there that you get better at your cognizance with nicotine and compared to work that's been done elsewhere with those other compounds, caffeine and illicit drugs like cocaine and others where there is a difference -- there's a different pattern. But it's been so long since I read those or heard those presentations, I'm not very good at recalling details.

Q. Do you know if Reynolds has done any research to determine what, if any, withdrawal effects there are related to people who stop smoking?

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A. I don't know of any.

Q. Has Reynolds done any research with respect to any of the stop smoking or withdrawal sensation assisters that are on the market such as Nicoderm?

A. When we were working on Premier, we compared -- as I've already stated -- blood levels and urinary levels of nicotine and cotinine with Premier and other cigarettes. And we compared that to the literature reports on the patch and on the gum. But we didn't do any work with the patch or the gum ourselves. We just compared it to the published literature. I don't know of any -- any others.

Q. Has Reynolds done any work since you began in '84 to see if nicotine played any role in promoting tumors?

A. In recent years, Reynolds has looked at a couple of items regarding nicotine and cotinine and in vitro cell assays. Dave Dolittle and his labs have found that nicotine and cotinine reduce the binding of certain carcinogens to cells in the airways and other cells. And they have found and looked at and published nicotine-cotinine reduces some assays of mutagenicity of cigarette smoke. In other words, nicotine and cotinine have some

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protective effects. And that's Dr. Dolittle's work. He's been presenting that the last year or two.

Q. Do you believe that nicotine is a drug?

MR. BELASIC: Object to the form. "Drug" is undefined.

Q. Do you know what I mean by "drug"?

A. Why don't you tell me so I have a better feel for what you're asking?

Q. What is your understanding of the definition of a drug?

A. Well, in vague terms, I can tell you my definition and then you can tell me if that's what you mean -- if that's what we're doing here. A drug is a substance or a compound given to purposely alter the function and structure of the body.

Q. Structure and function or structure or function?

A. Either/or, and/or.

Q. Is that a definition the FDA uses?

A. I don't know what the FDA presently uses. They used that definition when I worked for DuPont, which also has a pharmaceutical wing, but I don't know what they use today.

Q. Does it have to have adverse effects?

A. No. I mean obviously drugs for therapy, there

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are some -- and thank God there are -- that don't have adverse effects.

Q. And obviously it doesn't have to be addictive, correct?

A. That's correct.

Q. Does it have to be intended to alter the structure or function of the body or --

A. That's -- excuse me.

Q. -- or if it has that effect?

A. Whether intended to or not? Well, certainly in the old days when I worked for the government, that had to be the intention. For example, caffeine in coffee and nicotine in tobacco was not considered by the government or the scientific community to be drugs because they weren't intended to alter the function or the structure of the body.

Today I'm not so sure anymore with some of the discussion especially by government scientists as to what a drug is or isn't. The FDA definition today may be different. It doesn't matter what its intention was; if they call it a drug, it's a drug. That seems to be the way it is.

Q. Did you ever do any work at Reynolds that addressed the issue of whether or not nicotine should be considered a drug?

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A. No. When -- you mentioned the 1988 surgeon general's report about addiction. And I believe, if my memory serves me correctly, there was a discussion about whether or not nicotine was a drug in that report. Some of Dr. Suber's group looked at the literature to see what, if any, citations were there about structure and function of the body as to nicotine. That's not research. That's the literature of research. Other than that, I don't know of any.

Q. Did you participate in any proceedings before the FDA to attempt to convince the FDA that nicotine should not be regulated as a drug?

A. No, I didn't participate in any of those.

Q. Did you provide any material to anyone who did participate?

A. The law firm -- Rich Cooper, I referred to earlier today.

MR. BELASIC: Stop right there.

THE WITNESS: Okay.

Q. Well, you can understand -- I don't want to hear about communications with lawyers. You can tell me things you did.

MR. BELASIC: You don't have to describe work product that you did for lawyers either.

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A. I didn't do any for the lawyers. I was just going to say they -- well, they looked at our publications on Eclipse for our argument as to why Eclipse should not be regulated. So we gave them publications. We didn't write anything for them.

Q. How is Eclipse different than a normal Winston cigarette?

A. It doesn't burn down. So the debate was since it doesn't burn down, is it or isn't it a cigarette?

Q. Is it on the market?

A. Yes.

Q. How is it doing?

A. It holding its own. We're working on improving it.

Q. So how is it different from Premier?

A. Tastes much better. Lights easier.

Q. The tobacco doesn't burn, it just heats?

A. That's the other difference. Premier burned no or very little tobacco. Eclipse burns about five percent of the tobacco other cigarettes do.

Q. Does it -- does Eclipse contain resins that are sprayed with nicotine?

A. No.

Q. Premier did though, didn't it?

A. I don't know what you mean by resins. What

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Premier had was --

Q. Put on --

A. -- tobacco suspensions sprayed on lumina beads and it had a tobacco roll around the capsule. It was a water suspension sprayed on and allowed to dry on those beads.

Q. And the water suspension contained nicotine, did it not?

A. Yes, it contained nicotine and other water soluble components of tobacco.

Q. What tests has Reynolds done since 1984 to determine that the ingredients it uses in its cigarettes are safe for human consumption?

A. We from time to time have looked at chemistry and short-term bioassays. Some longer term bioassays for components of Eclipse, Premier and other cigarettes. Some -- some of the work that we've benefited from were done at other places and published by other companies or by the government themselves.

In the case of the less hazardous cigarette program back in the sixties through -- in the seventies, we used some of their literature. We have used -- there is a lab -- I forget the name of it. There was one. I guess it's still there in Georgia,

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a USDA lab that does pyrolysis of ingredients in different fractions of tobacco. And we have followed their work as well as done our own.

Q. Since 1984, has Reynolds tested all of the additives it uses in its tobacco process?

A. Some of them were tested before then and some were -- as I just stated, were done by other companies or other government labs.

Q. Does it test the end smoke product to determine if it's safe for human consumption?

A. We test it to determine what its relative toxicity is to other products, other cigarettes on a frequent basis.

Q. Do you do comparative --

A. As I stated this morning, we do comparative toxicology.

Q. You don't do tests that which in and of themselves determine whether or not the end smoke product is safe for humans?

MR. BELASIC: Object to the form. If you're going to ask him that, then I think you need to tell him what you mean by "safe."

Q. Do you know? Were you confused by what I mean? Safe? Doesn't kill you? Doesn't cause cancer? Doesn't cause disease?

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A. We don't have agreed upon tests for safety or determining one cigarette's safety versus another. But we do have assays that we have developed and others have developed that we use to determine the relative toxicity of one cigarette versus the other. And we will not -- our policy is not to add to the toxicity or the biological activity of a cigarette versus those that are on the market and to try to lower it.

Is that safer? It's hard to say because there is no way I can improve it. But we certainly hope it has the potential to reduce the risk of cigarettes.

Q. And what risks do you know exist with respect to cigarette smoking?

A. Well, those that are frequently described in the newspaper and in the literature. Lung cancer, cardiovascular disease including stroke and atherosclerosis, heart attacks, bladder cancer, pharyngeal cancer.

Q. Emphysema?

A. Emphysema, chronic obstructive pulmonary disease including emphysema.

Q. When you say they are known to exist, you believe there are those risks related to smoking?

A. Yes, there are risks related to smoking.

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That's certainly been published time and time again in the epidemiology literature.

Q. Do you believe there is a cause-effect relationship between smoking and those diseases?

A. There may be. I don't know of a proof of that cause, but there certainly may be.

Q. What research has Reynolds undertaken to determine if there is a cause-effect relationship between smoking and those diseases?

A. Well, we've -- as I've said in the earlier part of the morning -- we've certainly funded work through CTR and other mechanisms. When I got here, we had work going on at Duke and UNC. Later we had work at the University of San Francisco Children's Hospital, British Columbia, emphysema. We funded it to see if we could add -- find out more about the understanding of the relationship of cigarette smoking to the onset of those diseases and whether or not there was new evidence that might provide missing links in causation.

In our own laboratories, we've looked at adducts and DNA repair, DNA synthesis differently and I believe better than anyone else to see if we could get an understanding of the mechanism about how cancer might evolve in a smoker. And we've used --

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an example in adducts work, we used that work to compare cigarettes like Eclipse or Premier or the one in Oklahoma City to other cigarettes to see if we can get a decrease in that activity -- that is adduct formation.

Q. Addict?

A. Adduct.

Q. How do you spell that?

A. A-d-d-u-c-t.

Q. When did you begin an adduct DNA repair research project?

A. Well, Dr. Chin Lee in the late eighties and Dr. Dave Dolittle and myself started making plans to take Dr. Randeraff -- we got a hold of him and had him come in and show us how he did it, used him as a consultant. He was the only one doing it at that time. So we started developing it then.

Q. And the purpose of this research was to determine if there was a cause-effect relationship between smoking and what disease?

A. Well, there were people like the Loveless Foundation and others who couldn't get cancer, but were getting adducts in laboratory animals. And they were saying that this may be important in human disease.

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So we were looking at it to see if we can understand what kind of adducts there were and what was the formation of them. We were also funding work at the same time at UCLA with Dr. Marty Klein to understand oncogenes better in lung cancer, both in smokers and nonsmokers.

Q. What research had Reynolds done prior to 1984 to determine if any of the diseases that you mentioned were caused by smoking?

MR. BELASIC: Object to the form. Haven't established foundation.

A. Like the -- like the CTR objectives of their funded research. If the universities came to us -- and they did -- and wanted funding to look at the disease process that might be relevant to smoking, lung cancer, lung structure.

For example, Duke University had some work going on with three-dimensional imaging of alveoli and bronchial airways and damage they would create with single components like ozone. And some of the changes that are seen in ozone are seen in cigarette smoke like metaplasias of different type. And they were trying to understand that process. They got funding from us. That was prior to me getting here.

And they had some work done at the University

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of North Carolina underway looking at different kinds of lung changes with different toxicants. And that was two examples I know of because they were still underway when I got here.

Other work -- I don't have a good feel for it. I know Dr. Barry Pierce out in the University of Colorado, Boulder, had some work going on to understand carcinogenicity in general. We funded that work as I understand it, much of it directly Reynolds did. I don't know who else was out there that got funding from us. I know there were others, but I don't have a good historical perspective.

Q. Why are the examples that you cited all for the most part -- other than the Chin Lee work -- why are they all done outside of Reynolds as opposed to in-house?

A. Well, prior to my coming here, I suppose the experts who were more experienced with that kind of work were out of house. Our folks were mainly chemists, toxicologists type that were by experience -- not by training -- toxicologists.

But I just was never that interested in the history of it. I was pleased to see that we had research on the outside going on and some on the inside, but I didn't get into why the proportion in

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and out was what it was.

Q. Why, since you've been there in '84, has most of the research been funded outside as opposed to in-house?

A. Well, I don't know -- we've done a lot of research in-house in that comparative testing mode, but with trying to add understanding to basic research. So I don't know how to parcel out how much is inside and outside. We certainly have spent more money on inside work than outside work.

Q. What inside work has published since '84 by Reynolds that would shed light on a cause-effect relationship between smoking and the diseases you mentioned?

A. Well, if you'll look at Dr. Chin's work and Dr. Dave Dolittle's work, some of Dr. Arnold Mosberg's work, you will see cigarette or components of cigarette that have been tested in-house. And they certainly have been followed with great interest by our critics as well as our friends. So I have to assume they shed light on it.

I mentioned earlier an example, neuron mutagenicity studies done by Dr. Dave Dolittle. And that certainly was thought to shed some light on the role of smoking versus diet on neuron mutagenicity in

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determining the exposure of carcinogens. I've already talked about the adduct work.

We've used post docs here in-house. We have a post doc program with Duke University, with Bowman Gray. There have been some others like Virginia Tech, I think, but those are the primary two. And we've looked at some of the basic questions about that.

We mentioned or we talked about earlier the relationship of nicotine to nitrosamines. Some of that work was not only -- all of it was not only done in-house, but some of it was done with post docs as well as scientists who work for Reynolds directly. Those are examples.

Q. Has Reynolds published any work which confirms that there is a link between smoking and lung cancer?

A. We have -- we have published work that sheds more knowledge on relationship of adduct formation to mutagenicity or adduct formation to tissue change. I don't know if that provides a missing -- or one of the missing links or not. It sheds more light on it. I don't know that it qualifies for a missing link.

Q. Has Reynolds published any research which confirms that there is a cause-effect relationship

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between smoking and cardiovascular disease?

A. We have certainly published work in comparative toxicology that looks at heart and major vessels, as well as other organ changes -- other organs. And what it's done is continue to provide evidence that there is no model for heart disease and smoke. The animals that we've looked at, there is nothing wrong with their hearts. Nothing wrong with their vessels.

And there are those and they've -- I mean I've met them at meetings and stuff -- that believe there is no causative link between heart disease and smoking and the worst smoking may do is just make the symptoms of heart disease worse, but not cause heart disease. So the work we published probably adds strength to that argument.

There's also a belief that if there is any effect on heart disease, it's a wash because some people believe -- I don't know if they are right or not -- that smoking's stress alleviation decreases risk of heart disease. And there's still others who believe the less average body weight in smokers offsets any risks of heart disease by smoking because if you are leaner, you have less risk. I don't know which ones of those are true or not.

And the only work that we've done is we've

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certainly -- when we've done Eclipse and Premier, we've showed the in-house work. We've showed -- we've evaluated the lipoproteins and other serum markers in smoking and shown no change for the worse in those studies.

So -- and there are others who believe that heart disease, carcinogens and cytotoxins in smoke are important for heart disease and we published work showing that there are less of those in Eclipse, Premier and the Winston Select Oklahoma City. The carbon scrubber low nitrogen blend product. But that's the closest I know of, of work we've done in-house that is of interest to those concerned about heart disease.

Q. You testified earlier that you believe there may be or could be a link between smoking and the diseases you mentioned. I'd like to go through them one by one, though, and ask you --

A. I said they were risk factors.

Q. Well, then you -- I know. And then the next question was, do you believe there may be a link between those diseases and a cause-effect relationship between smoking and those diseases. Let's go one by one. Do you believe that there's a cause-effect relationship between smoking and lung

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cancer?
A. There may be.
Q. Do you believe there is a cause-effect relationship between smoking and emphysema?
A. There may be.
Q. Do you believe there is a cause-effect relationship between smoking and cardiovascular disease?
A. There may be, although it's a weaker argument there.
Q. And by cause-effect, you understand what I mean?
A. Yeah.
Q. That smoking causes the disease?
A. That's pretty -- pretty straightforward English.
Q. Okay.
A. And my answer is it may be.
Q. Do you know if there was ever applied -- or were you aware of any pressure that was applied at RJR by internal or external attorneys not to do certain tests on ingredients that were used in cigarettes?
A. Never in my experience or anything I've heard.
Q. You've never seen any memos that would

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suggest that -- for example, that Council for Tobacco Research lawyers applied pressure to the tobacco industry to not do testing on ingredients?

A. I certainly have not seen such documents, nor am I aware of any.

Q. If I wanted to look for documents to determine if attorneys pressured Reynolds or other people in the tobacco industry to not test ingredients, who at Reynolds would be the best person to ask for those documents?

A. I don't know who it would be. I don't know of any such documents. Since '84, our librarian and Bob Suber in scientific affairs would have any documents that exist. I don't -- and if such a document existed, Bob would have brought it to my attention because he knows I wouldn't tolerate it as do the lawyers, although that's never even been an issue.

Q. Would your -- would toxicology or your group be aware of testing if there was testing being done on ingredients?

A. Yeah, on ingredients, sure. And/or on cigarettes, we'd be aware of it. It wouldn't be going on without our knowledge. Unless it's like the alleged White House in the Catalpa Mountains. There's a whole other unit out there underground.

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And I seriously doubt that there is. It'd have to be done with us and through us.

Q. I'll read from you -- read for you a footnote from a document that was prepared by Mr. John Edwards, Maynard Thomson and Robert McDermott of the law firm of Jones, Day, Reavis & Pogue.

MR. BELASIC: Let me make an objection for the record. I object to the use of that document. Let me identify the document for the record.

MR. MAISTROS: Yeah, we'll mark it Exhibit 3.

(PLAINTIFF'S EXHIBIT 3 MARKED FOR IDENTIFICATION.)

MR. BELASIC: Object to the introduction of the document, which is on its face -- Reynolds' objection to the introduction of this document, which on its face says both "privileged, confidential and attorney work product." It is both. It is a work product prepared by Jones Day in anticipation of litigation and directly for participation in litigation. It's also protected by the attorney-client privilege. Object to any questioning about it, to the introduction of the document and to its attachment as an exhibit.

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THE WITNESS: Do you want me to read the footnote here?

Q. Footnote on that page seven, footnote two. Could you read that out loud?

A. "A corporate misconduct test premised upon ingredients would consist of claims of testing which was both belated and inadequate, failure to make adequate inquiry into the composition of flavors produced by outside flavor houses, and the failure to remove ingredients known or shown to be harmful. There are memorandum in the RJRT files which reflect a desire by R & D personnel to test ingredients and which document the policies which the company has followed. A recent memo by a Lorillard employee (Alex Spears) to Dr. Hayes" -- it's kind of faded here -- "at RJRT suggests that in 1984, the Committee of Counsel thwarted the industry scientists' desires to assure the safety of product by testing ingredients adequately."

Q. First of all, do you know who Alex Spears is?

A. Yes, I do.

Q. Do you know who Dr. Hayes is?

A. Yes, I do.

Q. Dr. Hayes was an employee of Reynolds?

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A. Yes.

Q. For a while, director of toxicology?

A. Director of biochemical biobehavior. He never was director of toxicology. That was me.

Q. He was on an even par with you? Above you? He was above you?

A. He was -- I believe his level of director when he first came and when I came was a notch or two higher than mine.

Q. And how do you know Alex Spears?

A. Saw Alex Spears one day over here in Wally's office. He came by to say hello about a year after we got here. And then I interacted with him on a regular basis at the CIAR from about 1990 on.

Q. Do you know what the Committee of Counsel is?

A. Well, you know, in principle, they are a group of lawyers.

Q. Who are they?

A. I don't even know.

Q. Who do they --

A. I mean today -- if it exists today, I imagine Chuck Blixt would belong to it. But I don't know who else is on it.

Q. Who did they counsel?

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A. I assume the industry. I don't know. I don't know much about them.

Q. Are you aware of any memorandum in the RJRT files which reflect desire by R & D personnel to test ingredients which document the policies which the company has followed?

A. I'm certainly aware of memos in our files where we talked about different ingredients and whether we should test them and when we did, or whether we shouldn't test them and why.

Q. And are you aware of incidences in which the Committee of Counsel thwarted industry scientists' desires to assure the safety of the product by testing ingredients adequately?

A. No, I'm not aware of any.

Q. And do you know what documents that Mr. McDermott, Edwards or Thomson are referring to?

MR. BELASIC: Object to your statement to the extent it suggests that those documents reflect what you just said in your prior sentence because that's not what that memo says.

Q. I just said do you know what documents Mr. McDermott, Thomson and Edwards are referring to in this footnote?

A. This is the first I've ever heard anything like

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this. I don't know anything about this. I find it hard to believe. But you know, if it exists or not, I don't know.

Q. Have you ever met Mr. McDermott?

A. Yes.

Q. Have you ever met Mr. Edwards?

A. I don't remember ever meeting him.

Q. Have you ever met Mr. Maynard Thomson?

A. I believe I've met him, but just briefly.

Q. Have you ever met with the Committee of Counsel?

A. Never.

Q. Did they advise CTR?

A. I don't -- I don't know if they did or not. I don't know of any instance.

Q. Well, how do you know of them?

A. Of who?

Q. The Committee of Counsel?

A. I've heard the name. I don't know what relationship they have to CTR. I mean it's very possible that they've had some interaction with CTR. I just don't know. What I understood the Committee of Counsel to be is the chief counsel of each company. They meet together and talk about litigation strategy.

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Q. As a group?
A. I would suppose. I really know very little about them. We don't have -- but if we had a Council of research directors, I'd been on it and the different R & D directors would be on it, so I guess it's something like that for lawyers. I assure you they never told me what I could or couldn't do, and they wouldn't be very successful if they did.
Q. Did you ever investigate whether or not Philip Morris was using ammonia in its tobacco process in any fashion to affect nicotine?
A. No, not to affect nicotine. We followed with interest the internet, B & W and Philip Morris issues which included ammonia and their use of it. We have certainly been interested in what makes Marlboro Lights and Marlboro Full Flavor so popular with smokers and we speculate over the importance of ammonia on that.
Q. Have you done any tests to determine why Marlboros are popular other than those tests that you just mentioned?
A. We tried, and successfully I might add, in trying to develop cigarettes that are just as acceptable to Marlboro smokers as Marlboro is. We've been able to develop at least half a dozen cigarettes

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that are, probably more like eight or nine.

Q. And what is your conclusion as to why those cigarettes were successful?

A. That a mild taste with a macho image seems to be important.

Q. Did you look at the pH levels of Marlboro?

A. Very rarely, if ever. For some time what little pH we've done, theirs is in the same ball park as ours. So we don't think their taste success with smokers has anything to do with pH. We have other theories other than ammonia as to why their product tastes good. And since we've been able to duplicate it with those theories, we think there is a lot more important things than ammonia in their cigarettes.

Q. What cigarette duplicates Marlboro?

A. We have some prototypes that are proprietary because we have interest in marketing them.

Q. None that are marketed yet?

A. That's correct. We have one -- a Camel Light that is parity to it, which we've introduced as a project improvement last year. Doesn't use ammonia.

Q. How does the nicotine yields compare to Marlboro?

A. I don't really recall. If it's in that window

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I described earlier, it doesn't matter. There may be others who could give you that comparison, but I couldn't.

Q. Which window?

A. Pardon me?

Q. Which window?

A. You know I talked about as long as your yield of nicotine is in a certain level for each tar group, your cigarette won't taste too strong or too bland -- as long as you are in that window. It's rather empirical, but that seems to be a good rule of thumb. You're okay.

Q. Are you talking about there's a window for all cigarettes or within brands?

A. In tar --

Q. Related to tar?

A. -- categories of all cigarettes. For lights, ultra low tar, full flavor. It's a very sloppy rule of thumb, but served us well. If we make a cigarette and we track the type of tobacco we use, control for tar. Nicotine, as I said earlier, indirectly follows tar -- you should be in that window. And as long as you're in that window, you're okay.

(MR. MAISTROS AND MS. KNISELY CONFER OFF THE RECORD.)

Q. Let's talk for a moment, if you would.

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What is your knowledge of Reynolds' use of expanded tobacco?

A. It's very limited. Alan Rodgman acquainted me with the use of expanded tobacco when I first arrived. And that's been what Bob Suber and others in product development have worked with more so than me. I know that we used Freon 11 and then we switched to carbon dioxide. We looked at -- we're still looking at other ways to expand tobacco.

(MS. KNISELY EXITS CONFERENCE ROOM AT 3:25 P.M.)

Q. What process was in use for '84? Freon 11?

A. Freon 11 was an expanding agent that was used by us and other people in the industry. Freon would expand the leaf of the tobacco, the lamina so that you had less mass of tobacco, less tobacco burned. It was one of the things that the National Cancer Institute studies on cigarettes said would decrease toxicity or tumor genecity in mice.

At that time freon was used and very little, if any, residue was left in this product. We tested for that to make sure there was not freon in smoke. But we had to get rid of it because the governments of the world, the WHO and others wanted everybody to get out of freon other than the air conditioning

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industry -- and they, too, were asked to find another kind of freon, which they did.

And so Freon 11 because of the ozone level -- layer that's protective for U.V. light, it was considered a major concern. So we were asked and advised by government officials and other people as an industry to get out of it, so we started work on getting out of it.

Q. And you switched to?

A. Carbon dioxide.

Q. When?

A. Gosh, I -- I'm guessing early nineties.

Q. Is the only method to expand tobacco currently in use carbon dioxide?

A. We're looking at some others, so the answer is there are other methods. We're looking at a propane method that we patented, seeing if we can scale it up. We're looking at steam methods to expand or swell tobacco to replace it.

Q. Is all tobacco utilized at Reynolds expanded?

A. No, just some parts.

Q. Which parts?

A. Well, I think the highest -- again, I'm not the expert, but the highest is in the high teens so you

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know, like 17 percent expanded tobacco in the blend. Most of them are down below -- well below ten percent, as I understand it.

Q. Is reconstituted tobacco expanded?

A. No, no.

Q. Did anyone ever look at that?

A. We've tried. And that's why we're thinking about steam. Steam will expand the stems pretty well that you use in G-7, but you'll probably not use it in reconstituted sheet. You'd probably use it alone or use it in that cut-roll-stem, that CRS process. So we're evaluating it for that use. And that would replace expanded tobacco, or a lot of it.

Q. And is the expanded tobacco that is manufactured, is that at one location or multiple locations?

A. I think it's at two locations, but the major one is at Tobaccoville. I don't know if two still exists or not. I think there used to be two. So there is at least one, maybe two.

Q. Where is Tobaccoville?

A. It's in Tobaccoville, if you'll pardon that. But both the town and the facility were named -- the facility was named after the town. It's strange, but that's the way it is.

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Q. What effect does expansion of the tobacco have on the nicotine yields?

A. It lowers it.

Q. What effect does expansion of the tobacco have on the nicotine absorption rate?

A. None, if any.

Q. What effect does expansion of the tobacco have on the nicotine transfer rates?

A. I doubt that it has any. I don't know. There's less nicotine so there ought to be less transfer and less absorption per cigarette, but I don't know.

Q. Is there -- well, first I guess I ask you if you believe in the free nicotine theory?

A. I think what you heard from me was I believe you can free up nicotine, but at enormous levels of ammonia or salts or acids or anything that will run the pH up or bring down the irritation of nicotine. You might can raise it, but you have to use such high levels that the products taste awful.

Q. You don't know -- or do you know if the expansion process affects the free nicotine?

A. I don't know, but if it -- since heat is used, it would -- any volatile nicotine that's there would be driven off. So it wouldn't be there. But I don't

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know. It's a very good working hypothesis that any effect on nicotine, if any in expanded tobacco, is to drive it off, not to increase it.

(MS. KNISELY ENTERS CONFERENCE ROOM AT 3:30 P.M.)

Q. Are there different varieties of expanded tobacco with different specs?

A. Not really. I mean freon was G-13, I think. And I think CO2, carbon dioxide is G-19. So it's either -- in the old days, it was freon. Today it's CO2. They have different names, G-19 and G-13. And I don't know what the "G" stands for. So that's what we use today is carbon dioxide expanded tobacco. We're working on processes to look at propane and steam.

Q. All right. But is there expanded tobacco that has different nicotine tar yields?

A. I don't know. Since you have less bio mass, you've got the same volume occupied by less nicotine, you're going to have less nicotine in that volume. Other than that, I don't know.

Q. For example, could I call up and say, "Give me expanded tobacco that has a tar level of two milligrams and a nicotine level of one milligram"?

A. No, they wouldn't know what to give you. What you do at Reynolds is you call into our in-feed, our

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supply, and you tell them what volume and/or weight of expanded tobacco you need for a blend. And you don't ask for tar or nicotine from that. It's how much by weight a given blend is expanded tobacco.

Q. And when you say blend --

A. It's the whole rod, tobacco rod. All the parts in it is the blend.

Q. As I sit here and hold a cigarette, are there different tobacco blends in that cigarette?

A. Yeah, they vary from cigarette to cigarette. Camel's claim to fame was it was the first three-tobacco blend. It used burley, flue-cured and Turkish. These days, reconstituted sheet and expanded tobacco can be part of the blend and it certainly helps you move the tar down -- both to move the tar down. And nicotine will follow, go down as well.

And we do not have a variety of expanded tobacco or variety of G-7 that is known to be higher or lower nicotine. They all fall in a certain range. So now, theoretically and probably realistically if you expanded burley, the expanded burley tobacco would be higher nicotine than expanded flue-cured. And we certainly do ask for different in our specs -- most tobacco is burley that's expanded, but you can

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get flue-cured expanded tobacco.

Q. What -- you said there is a range of up to 17 percent typically of expanded tobacco?

A. It's just an educated guess. I don't know what our highest level is. We --

Q. What's your range, you think, percentage-wise of reconstituted in a typical cigarette -- RJR cigarette?

A. It's usually below ten percent also. When you get down to Now and we have a competitor that has Carlton, you may approach 30, 40 percent combination of constituted and expanded tobacco when you add them together, so each may be around 15 percent or whatever. I don't know. I'm not familiar with the exact formulations.

Q. Is it --

A. But they have higher because we want the tar lower.

Q. That's what I was going to ask you. Is there a correlation between full flavor, regular and low tar cigarettes and the amount of reconstituted and expanded tobacco in those products?

A. As a rule, as you go down in tar level, they are apt to have a higher level of reconstituted sheet and expanded tobacco. I know of a brand in Germany,

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for example, that's introduced by a competitor four years ago. And I understand that the combination of the expanded tobacco cash sheet, which is a form of reconstituted sheet, was approaching 50 percent. I don't know of any brand we have that goes that high.

Q. What was the original purpose behind using the expanded tobacco process?

A. I don't know. Alan Rodgman would know the answer to that. But what -- it became -- I don't know what the original incentive to do it was. I know Alan was always interested in it because it would lower chemistry. I would suspect there was a cost savings as well. There was both, I would suspect, but I don't know.

Q. So --

A. As a consequence, the NCI got very interested in it. And I guess Reynolds, more than anyone else, pioneered that field.

Q. And there's a cost savings because you have less tobacco taking up more space?

A. Yeah, but the process is expensive so it's not as great a savings as you think. It's just a little bit of a savings. In fact, one of the reasons we're interested in steam expansion is it would be, perhaps we think, better smoking expanded tobacco. And no

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more expensive and probably cheaper than CO2 expanded tobacco. So it has a qualitative advantage, we believe, of working on it that will also have a cost advantage if we're successful because it would require less equipment and less labor.

Q. When you promote the -- you market the expanded tobacco process to other companies, do you not?

A. We certainly did freon and we do some CO2.

Q. When you market that process to other companies, do you cite to the reduced cost because of the increase in volume of the tobacco?

A. They know why they are interested in expanded tobacco. So when they cross-license it from us, we don't have to tell them what the advantages are --

Q. Does your --

A. -- because they already know it.

Q. Does your promotional literature point to the reduced biological activity related to expanded tobacco?

A. I don't know. I don't know what literature is used for that. I don't get involved in licensing technology to other companies.

Q. You mentioned earlier levulinic acid?

A. Levulinic.

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Q. Levulinic acid. How do you spell that?
A. L-e-v-u-l-i-n-i-c, I believe, acid.
Q. And how is that used in the tobacco process?
A. It's not.
Q. Why did you mention it?
A. Because we were trying to see if it would work for a low TN cigarette. We never used it commercially because as I said this morning, we never could get past the off taste -- especially the after-taste.
Q. Low TN is low tar and nicotine?
A. Low tar to nicotine. That's correct.
Q. Were there any allegations of or suggestion of increased biological activity as a result of the use of that acid?
A. No, none whatsoever. We looked at the acid itself and it has low biological activity. And obviously if it would allow you to develop a cigarette with less tar, it would have less biological activity.
Q. Well --
A. And we didn't get far enough along with it. We did some testing, limited testing. We never could get over the taste problems, so we didn't pursue it

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any further.

Q. And there was no link between the use of that compound and tumors?

A. No.

Q. And no link between the use of that compound and increased chemical reactions or chemical activity?

A. None that I know of. Obviously it had more levulinic acid in it. But we didn't see any pronounced changes in other constituents so we thought it would be a good deal -- you know, good thing to use.

Q. Now, does Reynolds today test all the ingredients it uses?

A. Well, if we use an ingredient that we've already been using at a lower level, we don't test that. If we use a brand new ingredient, we test it. If we use an old ingredient at significantly higher levels, we test it.

Q. Well, how do you know if that ingredient you're using now has been tested in the past?

A. I wouldn't know the details on that. Dr. Suber would. He would know whether we've tested it, the NCI had tested it, another company would have tested or whether it had been tested overseas. He keeps up

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with that.

Q. And when I say "test," I'm including do you test your ingredients to determine what effect burning or heating has on those ingredients?

A. Sometimes. It depends on whether that has been done before or not.

Q. What if it hasn't been done?

A. We usually do it then. We looked at beta carotene because of the interest in the literature on it. We decided not to add it because it forms a carcinogen when it's burned. It's one example. There could be others, but that's a good one.

Q. Now, would the same rule apply if you had been using the ingredient? Would you heat or burn the ingredient to determine the effects it might have?

A. If we've been using it, it's probably -- it's already been done either here or somewhere else.

Q. So you don't -- you've used ammonia in the past, correct?

A. DAP, diammonium phosphate.

Q. DAP, I'm sorry. You've used DAP in the past, correct?

A. That's correct.

Q. So you have no reason to test DAP today

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to determine its potential effects?
A. Either as a standalone or in the product, it was tested when it first began being used. And Dr. Suber would have to give you the history on that one.

MR. MAISTROS: Okay. Could we take a break for a minute?

MR. BELASIC: Sure.

THE VIDEOGRAPHER: We're going off the record at 3:39 p.m.

(RECESS TAKEN FROM 3:39 P.M. TO 3:56 P.M.)

THE VIDEOGRAPHER: We're going back on the record at 3:56 p.m..

BY MR. MAISTROS:

Q. Do you know if Reynolds has done research to determine the effect that exposing tobaccos to heat has on nicotine levels? I'm talking about end product cigarettes, just letting them get warm?
A. No, I sure don't. We've certainly done heat profiles on condensates to see if it changes their biological activity, but not anything related to nicotine.

Q. Has Reynolds done any work to determine if the moisture content of tobacco affects the nicotine yields?

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A. Nothing directly that I'm aware of. We certainly have looked at types of heat treatment as to how dry it makes the tobacco. And if the heat is too dry or too high, you probably drive off all volatiles and all moisture, including nicotine. So we looked at the weight and moisture content of tobacco in different heat treatments. We've done that before.

Q. Do you know if Reynolds has done research to determine the effect that fertilizers have on nicotine yields?

A. I believe years ago that Reynolds, or Reynolds and others looked at fertilizers and nicotine yield of leaf, but I've just heard rumors to that effect. I don't know what they are and when they were.

Q. Has Reynolds developed tobacco that has specific nicotine yields?

A. We have not developed any to my knowledge. We've looked at Avoca Farms and some experimental fields we've rented here. We've looked at different strains of tobacco for disease resistance to mold. We would know their nicotine content when they are mature and harvested like we do any tobacco, but we weren't looking at them for their nicotine content.

Q. Where does Reynolds get the tobacco it

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uses in its cigarettes?

A. We buy them on the open market from farmers and farmer co-ops. In recent years, we use buyers to do it as opposed to doing it by our own buyers.

Q. Do you buy it from overseas?

A. Some. Turkish especially.

Q. Do you grow tobacco overseas?

A. I don't know of any tobacco we grow overseas. And we have a company that's Tobacco International. I don't know what their practices are. I doubt that they do any contract farming. I think they buy it on the open market like we do, but I don't know.

Q. When you buy tobacco on the open market, can you buy tobacco with certain nicotine yields, pre-known?

A. No, you can buy -- no. You can look at the stalk position and the kind of tobacco and have a pretty good guess what the nicotine level would be and the sugar level, but it's a very unscientific process.

Q. Does the sugar levels affect the nicotine yields?

A. Not that I know of.

Q. You mentioned earlier this morning that the paper could have an effect on the nicotine

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yields?
A. The paper could have an effect on the tar yields and therefore somewhat on the nicotine yields.
Q. How does the paper affect the tar yields?
A. Well, if it's highly porous, less particulates come through the tobacco rod through the filter. If it's not very porous, more of the particulates come through and theoretically as well, the nicotine.
Q. Are there different types of paper used on the different Reynolds brands of cigarettes?
A. Yes.
Q. And what's the main purpose in using different types of paper?
A. They help control how much air flow comes through them and how much air dilution therefore there is. You take that and ventilation and filters to control tar.
Q. Consequently doesn't it also control the nicotine?
A. Whatever nicotine follows the tar, there will be some control of the particulate and gas phase components. Nicotine in the tar phase and gaseous compounds in the vapor phase could be controlled.
Q. How long -- first of all, is it possible to completely remove the nicotine from the tobacco?

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A. Yes, it's possible.

Q. How long --

A. To probably remove 99.5 to 99.9 percent.

Q. How long has that capability been in existence?

A. I don't know. There were different wet lab procedures if you wanted to, to get nicotine out of tobacco if you wanted to look at the biological activity and the chemistry of tobacco with and without nicotine. I was aware of them, just generally known in the literature.

In terms of manufacturing processes to do it, to completely remove nicotine, the procedure that Philip Morris had when they came out with Next and our Rest procedure I discussed this morning are the only ways I know of to do it in an -- a manufacturing scale. And ours is still theoretical because we never used it in manufacturing. But the lab unit is such that we're confident it could be made in manufacturing.

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Q. What taste properties does nicotine have?

A. Well --

Q. Is it sweet? Is it bitter?

A. I would say more a bitter -- bitter note.

Q. Are there compounds that are added to the

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cigarettes to hide that bitter taste or dilute that bitter taste?

A. There are compounds -- there are flavorants that give us sweet note, so it could offset some of that bitterness of nicotine theoretically for taste.

Q. Aren't there specific flavorants, top-dressings, compounds that are added to mask the bitter taste of nicotine?

A. I don't know of anyone that uses them for masking nicotine bitterness. I know we and others have used sugars and other compounds or flavorants to give a more balanced taste to the smoke, but they don't mask nicotine. They might balance it, to use rather primitive taste perception terms. You don't want to mask too much taste of nicotine. Then you lose your tobacco note, your tobacco taste.

Q. What's the tobacco note?

A. Well, it's like coffee that's black. It has a robust, borderline bitterness to it. When you ask smokers to describe it for you, they have a hard time doing it. Pipe smokers can get closer than cigarette smokers can in describing a tobacco taste, but it's -- they'll talk about smoothness and harshness and sweetness and bitterness, but that's about the closest they get to it.

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Q. What specific health benefits do you know exist with respect to nicotine?

A. Well, it's all conjecture that nicotine may -- and apparently does cause some relaxation for people, some feeling of alertness and stress alleviation. Whatever comes from that would probably be a benefit because of all the stuff you read in the literature about stress. But I don't believe anybody has been able to prove that nicotine prolongs life or improves health through stress alleviation. It's just speculated upon.

The work I referred to earlier that Dr. Dolittle did, it could have implications of the benefit of decreasing the toxicity of cigarette smoke in those assays he used, but that's speculation. The benefits are considered to be relaxation, alertness -- mental alertness.

Q. Has Reynolds ever marketed cigarettes promoting its relaxation and alertness effects of nicotine?

A. Not that I know of.

Q. Why?

A. Because we can't prove it. We're not going to make any claims in marketing that we can't prove. As I said, it's speculation.

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Q. Has Reynolds ever marketed its lower tar and lower nicotine cigarettes as safer cigarettes?

A. Just -- I don't know what they did before I got here, but since I've been here, it's -- they just talk about being low tar or among the lowest tar. They don't make a health claim with it. I don't know what they did back in the forties and fifties and sixties. I don't know.

Q. Is Reynolds interested in reducing the health risks related to cigarettes or associated with cigarette smoking?

A. Yes, as I said this morning.

Q. Are they also interested in reducing the perceived health risks related to smoking?

A. Perceived risks? You mean a risk that may not be real, but just perceived? Not per se. We would -- those risks that have been articulated in the epidemiological literature. The only example that is anywhere near what you're talking about is smokers tell us they want -- have told us they want a cigarette with little or no flavorants and we've certainly recently introduced a Winston style to address that desire.

Q. When have they told you they want cigarettes with little or no flavorants?

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A. Well, the first time I ran across it was some consumer research we did down in Tampa about three or four years ago. A guy in marketing who does consumer research, Doug Webber and his team -- he started about three and a half or four years ago picking up on that -- that desire or that request. I remember a lady in Tampa talking about she only smokes French cigarettes because they don't have flavors in them.

Q. Did consumers tell Reynolds they wanted lower tar cigarettes?

A. Yes, they have before.

Q. Did they say why?

A. They believe it's better for them.

Q. Is it?

A. To some degree, if you believe the epidemiology literature, it probably is in that it's less risk for cancer.

Q. Lower tar cigarettes provide less risk for cancer?

A. So it's claimed in the literature. It's reasonable, but not provable.

Q. Well, I guess you would agree that lower tar cigarettes have less biological activity?

A. Yes.

Q. As a general proposition?

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A. As a general proposition.

Q. And you would agree that less biological activity is a better thing from a biological mutagenicity health standpoint?

A. It's -- yeah, it's something we strive to do because we believe it's the right thing to do.

Q. Do you believe that there is a cause and effect relationship between less biological activity and reduced health risks?

A. I believe that the tests that we do for biological activity and toxicological activity or toxicity is the best and the closest thing we can do to lower the risks of cigarettes. But I don't know if that answers your question.

Q. Well, I'm trying to get at some conclusions. If you agree that less biological activity is better, correct?

A. (Witness nods head up and down.)

Q. From a health standpoint? Do you agree with that or not?

A. It probably is.

Q. And you would agree that lower tar cigarettes have less biological activity?

A. In many cases they do.

Q. Then wouldn't you also agree it's a

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logical assumption to assume that lower tar cigarettes pose less of a health risk?

A. For some diseases they probably do.

Q. And my question is why wouldn't Reynolds advertise that?

A. Well, we can't prove that it causes less onset of disease. Some of the epidemiology studies that have been done out of Europe report less of an incidence with lower tar cigarettes of cancer.

Many of the public health officials out there believe -- I don't know if they are right or wrong -- that heart disease is not improved by lower tar cigarettes. So if we went out there calling it less risk, health risk, we would rightfully catch a lot of criticism because we may not have helped heart disease.

Q. Do you believe that the introduction and proliferation of lower tar cigarettes addressed health risks or perceived health risks?

A. I believe, but I can't prove, that it helped address concerns about cancer. I don't know if it helped at all with cardiovascular disease.

Q. Do you know if any aspect of Reynolds' introduction and marketing of lower tar cigarettes was to address perceived health risks as opposed to

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real health risks?

A. I don't know. I mean it's such a complicated area. I mean there is reason to believe that lower tar cigarettes may decrease the incidence of lung cancer in smokers. There is no reason to believe they may help significantly in heart disease.

The public health community back in the sixties and seventies -- and those articles exist in my files and libraries -- were pushing the industry to bring in lower tar cigarettes. Then they began to back off that somewhat. As I say, you heard me discuss the English and German approach and the European approach, they thought low tar cigarettes was the way to go and have maintained nicotine, not lower nicotine.

So we tried to incorporate all these suggestions and have our overall product development scheme on that. Certainly smokers perceive lower tar cigarettes in some ways to be better for them, and therefore they want them.

Q. But you can't prove that they are?

A. Huh-uh, can't prove that they are. And that's the main reason we shouldn't tout them as lower risk products because we can't prove it.

Q. So any suggestion that lower tar

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cigarettes are lower risk products from a health standpoint would be not -- would be untrue?

A. It may be true. Who knows? It's a very -- it's complicated. There is -- there are epidemiological studies that suggest that they have less risks for cancer, but not for other disease.

Q. Does --

A. So I don't know whether it's true or not.

Q. Is the opposite true? Do higher tar cigarettes increase your chances of cancer?

A. I don't know. Because some people argue that they are harsh enough and strong enough that you don't inhale as deeply. So --

Q. Have your -- I'm sorry.

A. That's all right.

Q. Have you done any internal studies to determine if low tar smokers compensate for the low tar by increasing their puff rate or frequency?

A. We've done smoking behavior studies and some low tar smokers will take bigger puffs. We don't know how deep they inhale. We don't have a good objective way to measure that. And they might take more frequent puffs in some cases.

We have done 24-hour nicotine and cotinine in the urine and blood to show that their intake with

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their smoking behavior and their nicotine blood levels and their cotinine blood levels and urinary levels are less for lower tar cigarettes than full-flavor cigarettes. But -- you know, that's about all you can do. There is no way to measure how much penetration of alveoli there is of tar and nicotine.

Q. Hasn't Reynolds developed gas chromatography tests to determine that?

A. We have gas chromatography tests, but they don't determine what's going on in the lower lung. They are chemistry tests where you look at whatever chemical -- in this case, nicotine and other components you're interested in. You can look at it in smoke. You can look at it in serum or in the urine. And you can use a gas chromatograph to do that. But that doesn't tell you what's going on in the airways, top to bottom.

Q. Has Reynolds done any long-term tests on smokers who utilize low tar cigarettes to determine if they are truly getting less tar?

A. No. The closest thing is when we've done those urine mutagenicity studies. Some of the compounds in the tar are mutagens and we got with Premier and Eclipse less urine mutagenicity. We've not done any

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work for other low tar cigarettes to my knowledge and compare them to full flavor. We know in Premier and Eclipse it's lower.

Q. Why did Reynolds do tests to compare the mutagenicity of Premier cigarettes to the other cigarettes?

A. Well, let's see. In the mid eighties, there was beginning to be a lot of interest out there. Urine mutagenicity is a marker of carcinogen exposure. We knew that the health community was interested not only in smoke chemistry, but what the actual exposure of carcinogens to smokers are. So we used that as a surrogate measurement of exposure to carcinogens.

So the carcinogen or its metabolites end up in the urine and they give urine -- if you're on a controlled diet, a certain -- they give urine, if you're on a controlled diet, a certain increase in urine mutagenicity.

And we measured that between different -- between their usual brand and Premier, and their usual brand and Eclipse. And Eclipse and Premier have significantly less -- 70, 80 percent less urine mutagenicity which means their whole exposure to mutagens and carcinogens is low. That's the closest

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thing to what you're asking for we've done that I'm aware of.

Q. Why was Reynolds interested in obtaining those results insofar as Premier was concerned? Have they done that with other cigarettes?

A. It wasn't -- I mean we worked out the technique. It was very poorly -- it was out there. And the way it was done out there, it was more the result of diet than it was smoking. It was very poor. So we standardized it. They're very expensive studies.

You've got a -- that's why the NIH was so interested in it, including their head of lung cancer research. And we refined the method so that we could compare if Premier and later Eclipse, the smoke yield was so much lower -- 80, 90, 95, 98 percent reduced in certain carcinogens, what result would the total exposure of mutagens and carcinogens? What -- would that yield decreased urine mutagenicity? That was the question.

And that was the question out there in the literature that we perceived would be there for Premier and that's why we did it. And we did it again for Eclipse because it was so well received. But it is a dosimetry exposure, not a mechanistic

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study.

Q. And what studies have you done to determine if the carcinogenic levels of the compounds in your cigarettes that you market pose health risks?

A. We have done skin painting and smoke chemistry and mutagenicity studies to see what their levels of activities are amongst various brands.

Q. Skin painting? What was the second one?

A. Mutagenicity assays. Ames SEE's chrome labs, but they are not proof of relative cancer causing potential of different cigarettes. They are the best tools we have to look at the mutagenicity and carcinogenicity, but they are not equivalent to cancer in people.

Q. Why would then Reynolds -- one of their goals, I assume, of Premier is to reduce the carcinogens in the smoke?

A. Yes.

Q. Why was Reynolds interested in reducing the carcinogens in the smoke of Premier if there was no correlation with cancer?

A. Because that's what was suggested by the public health community and by outside scientists. And we believe overall it's a good thing to do. It's potential to do that. It's just not proof-positive

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that it does it.

Q. Well, when you were at Rohm & Haus, did you not accept the theory that the less carcinogens there were in a compound, the better off you were?

A. And that's the theory we have here, too.

Q. That was an accepted theory before you even joined Reynolds, wasn't it? That the less carcinogens you have in a compound, the better off you are from a human health standpoint?

A. Yeah, but it's not proof that you are definitely better off.

Q. There's no carcinogens that the scientific community would accept that pose adverse health consequences on humans?

A. Sure. There's -- there's eight known human carcinogens.

Q. How many of those eight known -- and when you say human --

A. Well, there is more than eight. But there's eight in cigarette smoke.

Q. Okay. There's eight known human carcinogens in cigarette smoke?

A. Yeah, they're classified by the World Health Organization as quote-unquote, "known human carcinogens."

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Q. And doesn't the scientific community as a whole accept the theory that those eight carcinogens cause or promote cancer?

A. Yes, they -- the consensus is they probably do. In a given -- you know, it's like one of them is nickel and one of them is chromium. Certainly metal foundry workers are exposed to those all the time. Not all of them get cancer. But since you can produce the cancer that's been seen in those workers in laboratory animals -- which is not true of cigarette smoke -- then it's presumed that it's a known human carcinogen?

Q. And for the lay people out there, a known human carcinogen is a substance which the scientific community accepts promotes or causes cancer?

A. It probably does. In some individuals, it won't. In others, it probably does. It's dose-dependent, of course, and exposure-dependent.

Q. Of those eight known carcinogens that are in cigarette smoke, what tests has Reynolds done to determine at what doses humans are at more risk?

A. We have not done tests to determine what doses. We've accepted the literature's belief that a certain dose is required before you get carcinogenicity -- carcinogenic activity.

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Q. Of those eight known human carcinogens that are in cigarette smoke, at what dose is it required to be taken into the human body through the smoking process --

A. We don't know the answer to that.

Q. -- to become carcinogenic?

A. And if you use -- if you use the data that is present on the compounds alone, by themselves, from industrial exposure -- they always turn out to be a lot higher than they are found in cigarette smoke. Without exception.

Q. Which of those eight human carcinogens could be removed today from cigarettes?

A. Well, they can be greatly decreased by heating tobacco. The 4-aminobiphenyl, the vinyl chloride, the benzene. Cadmium is greatly reduced by heating tobacco. Arsenic is greatly released.

These days nickel and chromium are either nondetectable in tobacco smoke or barely detectable, so it's hard to show any decrease in those anymore. Certainly Premier and Eclipse are greatly decreased in those metals from cigarettes years ago by looking at the literature. But today most cigarettes have nickel and chromium at non-detect levels.

Vinyl chloride is also removed by carbon

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filtration, especially like the one we have in that cigarette in Oklahoma. Beta naphthalene and 4-aminobiphenyl would be decreased by either heating tobacco or using low nitrogen blend tobaccos or using air dilution for general -- like low tar cigarettes, for general reductions as opposed to selective.

Benzene, general air dilution or heating tobacco lowers that. Arsenic -- yeah, that's the eight. I don't think I've left anybody out.

Q. And is it your testimony that Reynolds has not done any independent tests to determine at what doses those carcinogens pose a health risk to humans?

A. Because we don't know what doses. We don't know how to do it. We can only tell what doses are there and how you lower them and do that kind of work, but we don't know what dose is required to produce disease.

Q. So another way of saying it is that you don't know at what levels those compounds exist in the tobacco smoke?

A. We know what --

Q. And such level would have an adverse health effect?

MR. BELASIC: Object to the form.

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Misstates his testimony.

A. What I'm saying is that smoke is a complex mixture. When you look at these eight carcinogens or other compounds that are animal carcinogens and you look at the level they are found in smoke -- even if you look at three-pack-a-day, 30-year smokers, the doses are always lower than that required to produce cancer in a lab animal model or believed to be what workers are exposed to -- in dye workers and foundry workers to cause disease with compounds by themselves. Therefore, I don't know in a complex mixture like smoke -- nor do I believe anyone else knows -- what level is required to produce the disease of question.

Q. And you don't know if the mixture of those compounds and the process of burning the tobacco could reduce the levels or increase the levels that are necessary to cause those diseases?

A. I don't know what the levels are that are necessary to cause disease. So I don't know what levels have to be reduced to or not allowed to go up to, to prevent disease.

Q. So Reynolds does not know if those eight compounds in its tobacco and the tobacco smoke pose a health risk to humans?

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A. We do not know what level they pose that risk, so we act as if they do and try to lower them.

Q. The only given is that you know that at some level, those eight compounds the scientific community accepts the theory that they are not good for you?

A. They accept the theory that they are not good for you. And most honest scientists can't tell you what level they are bad for you. And I've seen in the last two years a change in risk assessment for carcinogens, a change of thinking. They used to think you had to model it linearly and zero is the only safe level Now, they're beginning to say that's not true anymore. That carcinogens are like other toxicants and there is a sigmoid-shaped response curve and it's not linear. So there is a level of even carcinogens that are probably okay.

The question is, for a human being, what are they? And one of the problems of trying to decide that, good cancer epidemiologists will tell you, good toxicologists will tell you that there are so many carcinogens in our environment and from our diet and from the air, it's hard to decide at what level a given carcinogen as a single compound will cross over that dose curve. It's very complicated. So we try

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to lower it in general such that smokers will theoretically benefit from our lowering it in general, but we don't know what level is the key.

Q. Now, when the scientific community accepts the notion that those eight compounds are carcinogenic, are they talking about in a natural state or heated or what?

A. It's as a compound, whether it's from heating or whether it's in a natural state.

Q. So does the scientific community know what effect heat has on the carcinogenic levels that are necessary to cause adverse health effects in this compound?

A. No, the scientific community doesn't know. What they have a better glimpse at is which one of those compounds are produced by pyrolysis. Not -- in other words, how does the compound come in existence. The heat doesn't make it any more toxic or less toxic. You can take a compound like a metal or one of the -- like 4-aminobiphenyl. You can give it to an animal and whether or not it's heated when you give it to him doesn't make any difference.

(MR. MAISTROS AND MS. KNISELY CONFER OFF THE RECORD.)

Q. What research has Reynolds done to make certain that those eight compounds are at their

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absolute lowest levels possible in its brands of cigarettes that it markets?

A. Well, when we come up with new products or new design products or new ingredients, we check out as many of them as we can. In the case of the chromium and the nickel as I stated earlier, it's nondetect or barely detect and it's hard to find a reduction in them because of that reason.

Q. What current products?

A. Well, we usually pick a brand of ours, brand of our competitors if it's a leading brand, and compare an Eclipse or a Premier or an E.W. to it. E.W. is the Oklahoma City cigarette.

(MS. KNISELY AND MR. MAISTROS CONFER OFF THE RECORD.)

A. So in those cigarettes that we believe may be beneficial as to risk but can't prove, we frequently look at those compounds in cigarette smoke and see if we've lowered them.

Q. Are there lower levels of those carcinogenic compounds in your lower tar cigarettes?

A. Generally.

Q. Are there higher levels in your higher tar cigarettes?

A. Not higher than other high tar cigarettes, but higher than the ultra low tar cigarette.

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Q. Is the consumer advised in any of your marketing literature that there's higher levels of carcinogenic compounds in your higher tar cigarettes?

A. They've been told that for many years by the press and by public health officials and by critics. So they have that impression that there are higher levels of bad stuff in high tar cigarettes and lower levels of bad stuff in low tar cigarettes from the -- whether it be Reader's Digest, whether it be New York Times. I mean it just -- over the years, that's where they hear that stuff.

Q. And hasn't Reynolds published literature over the years to refute that literature?

A. To refute it? That high tar cigarettes don't have higher levels of bad stuff?

Q. Yes.

A. I don't know of any. They may have; they may not have. I don't have any knowledge of that.

Q. Did you ever look at the Frank statement to smokers as it was published in 1954?

A. I've heard about it, but I haven't looked at it and I really don't know what it says, the Frank statement. I know it includes -- we don't believe cigarette smoke is guilty of everything it's been alleged to be, something like that. But I don't know

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what the rest of it says.

Q. Do you know why Reynolds and other tobacco companies circulated that statement?

A. I don't know why they did, if they did.

Q. This new cigarette that you mentioned that has little or no additives, what's it called?

A. Winston No Bull or Winston All Natural. It's called both.

Q. Is that "no bull" on the ads part of the name of the cigarette or is that an advertising slogan?

A. It's a slogan.

Q. What --

A. It's called Winston, just Winston. Winston Lights, Winston Full Flavor.

Q. What's the nicotine level of that cigarette compared to some other cigarette you're familiar with at Winston?

A. It'd be -- it's almost exactly -- you know, it's in that same window as the previous Winston and other full-flavor filtered cigarettes. And the previous Winston Lights and other filter light cigarettes. And I -- you know, I can give you a rough estimate on what that is.

Q. Is it a full-flavor cigarette?

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A. One style is.

Q. And you have a light? Natural?

A. Yes.

Q. And what does RJR mean by "no additives"?

A. We do not add flavors or processed ingredients or humectants to the tobacco rod.

Q. What was the third thing? Humectants?

A. Humectants, glycerol, propylene glycol, that kind of stuff. That makes smoke more moist. That's why they call it humectants.

Q. Are there top-dressings?

A. No.

Q. You say you didn't apply it to the rod. Do you apply anything to the paper?

A. No. The paper are standard papers from cigarette paper companies, vendors. They have salt in them to control burn rate. They don't have any flavors in the paper.

Q. Does it have reconstituted tobacco in it?

A. I'm not sure, but I think it does. But it's not -- it doesn't have any flavors in that reconstituted tobacco.

Q. Well, if it's got reconstituted tobacco in it, it would have ammonia in it, wouldn't it?

A. No, it does not. Does not have DAP in its G-7.

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Q. You can have G-7 without DAP?
A. Yes, I stated that earlier. So it must not be all that important for taste.
Q. Is there anything -- what, the DAP?
A. In G-7. Otherwise, we'd have to have it there.
Q. Was there anything that has replaced DAP in the G-7?
A. No. The G-7 has only tobacco in it and nothing else.
Q. Well, if you can make G-7 without DAP, why use DAP?
A. Like I stated this morning, for burn rate control and for integrity. So obviously any G-7 that's used in that Winston brand doesn't have as good a control of burn rate or rod integrity as other G-7s do.
Q. Is there any other cigarette Winston markets today that does not have DAP in the reconstituted tobacco?
MR. BELASIC: You mean --
A. I don't know. I'm not that familiar with the recipe of every brand style we have. The new one doesn't have it.
Q. And it's your testimony that the new Winston Natural has no additives? That means no

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additives?

A. No additives in the tobacco. As I've already -- I've just stated in the paper, there's some, you know, control salts. Calcium salts and magnesium salts.

Q. And what purpose do they serve?

A. To make the tobacco burn evenly, the paper burn down evenly.

Q. How about in the filters?

A. Just standard cellulose acetate tow filter with a standard coatings on the cellulose acetate tow fibers. No flavors in there. No humectants, no flavors in the papers or the filter.

Q. Why did Reynolds develop the Winston Natural?

A. Well, back to the work I referred to earlier that Doug Webber and others have done and the consumer research we did in Florida, they told us they wanted it.

Q. Earlier when you described the G-7 process, you talked about solvents that were used?

A. I did?

Q. You didn't?

A. I didn't mention solvents in G-7. I mentioned water.

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Q. Okay. Is that the only thing that is applied in the G-7 process? Water?

A. The only thing that -- well, only thing I know of except in whatever brands -- because I'm not an expert on this -- that we use top-dressing in G-7. Then obviously you apply sugar and flavors there. I don't know what brands have it or not. You'd have to ask some of our brands people that question.

Q. Well, the slurry of reconstituted tobacco?

A. Right.

Q. Is it just water in the Natural cigarette?

A. And DAP in many of them.

Q. No, in the Natural.

A. Oh, in the Natural? I'm sorry. In the Natural cigarette, it's water and tobacco stuff -- tobacco parts. Natural tobacco. Parts of parts, stuff of stuff, but it's tobacco.

Q. Nothing used to hold the stuff together after it goes through this process, G-7?

A. That obviously means you have to spend more time drying it out and you end up with a more fragile G-7. I -- I don't remember how much G-7 is in Winston No Bull. I'm just -- right now, I can't

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recall how much is there.

Q. Who came up with the slogan, "No bull"?

A. Who came up with that slogan? Is that your question?

Q. Yes.

A. Our marketing group did, and I don't know where they got it.

Q. How is Winston Natural doing?

A. It's doing real well.

Q. Is it nationwide?

A. It's rolling out gradually nationwide. It's in the process of rolling out nationally.

Q. What type of biological activity has been determined to exist with respect to Winston Naturals?

A. Well, we did some tests on it to make sure it wasn't any higher than other cigarettes in the same tar category. But which ones we did, you'd have to ask Dr. Suber and others. I didn't keep up with it.

Q. Does it have any reduced biological activity?

MR. BELASIC: Objection. He just said he doesn't know.

A. I don't -- I don't know if it does or not. It certainly doesn't have more. I don't know if it has less.

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Q. Who would know that?

A. You'd have to talk to Bob Suber and a Mr. Denny Potter in brands. He's the brand developer of that brand. And I just don't know what tests were done or not done.

Q. What is the difference between the nicotine yields of the low natural and the full flavor natural?

A. I can give you approximate numbers. On FTC, the smoke yields of nicotine for the lights is somewhere .8 and -- micrograms and one point -- excuse me -- milligrams. And 1.1 milligrams for the full flavor, one to 1.1.

Q. And how is that variation in nicotine yields achieved during the manufacturing process?

A. There will be a difference in the blends and the amount of reconstituted sheet. And there will be a difference in the ventilation on the filter.

And the lights would have more ventilation in the filter. The lights would probably have more reconstituted sheet and whatever other processed tobaccos are there. And whatever tobaccos are there have no flavors or no humectants in either the full flavor or the lights.

Q. Doesn't Reynolds control the nicotine in

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.the Winston Naturals?

A. They control the tar and whatever indirect control of nicotine is there as that result would be what it is.

Q. I asked you how you affected the yields on the Winston Selects and you mentioned those three things -- the nicotine yields, you mentioned those three things. So you were not suggesting then that those three things were controlled to affect the nicotine yields? They were used to control the tar yields?

A. They were used to control the tar yields. Whatever control you get of nicotine will follow the far. But the purpose of those things that I talked about are to hit tar levels in the lights and full flavor category. If we're successful with this brand, we will go after an ultra low tar version. So that the smokers have all choices on tar.

Q. Reynolds does use processes whereby it can alter the ratio between tar and nicotine, doesn't it?

A. In Eclipse, wet TPM -- because most of the tar in Eclipse is glycerol and water, so we use the term "wet TPM," not tar. We can use different kinds of tobacco to give a lower tar to nicotine or wet TPM to

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nicotine ratio.

In other cigarettes, Reynolds back in the sixties and seventies hit the wall on how they could control, if you will, ratio of tar to nicotine. Because we've been more effective in moving tar down than we have nicotine. And if you move tar down too far in relationship to nicotine, you make a harsher cigarette that smokers don't like.

So for a while we made progress in moving both tar and nicotine down and controlling that ratio. But once we got to 10 and below tar to nicotine ratio, we ran out of ideas. So that was one of the reasons we pursued tobacco heating cigarettes.

Q. Why was Reynolds working on controlling the tar to nicotine ratio in the sixties and seventies?

A. Because even then, the health professionals were saying that we ought to be looking at -- the industry ought to be looking on how to lower tar and nicotine both and not lower nicotine so much that nobody would buy the cigarette, especially in the seventies.

And even -- and we did certainly ignore that advice to a degree with Premier and Eclipse, but in cigarettes that burn down -- even if you do develop

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real low nicotine cigarettes that are not liked or if you develop real low tar cigarettes that the nicotine isn't as low in, they don't like them. So it's -- consumer acceptance and technology both had us hit a wall.

Q. In the studies that followed Premier that went along with Premier, they were eventually published, correct? In something called the monograph?

A. They were published in the monograph and in the peer-reviewed literature. We have published and made presentations of over 600 manuscripts and presentations that had abstracts published in the lab since 1990. We have published a lot in the peer reviewed literature.

Q. Are you talking about just Premier?

A. Premier, that cigarette in Oklahoma, Eclipse, smoking methodology, smoke chemistry of American cigarettes.

Q. Since when?

A. 1990, six hundred. I mean we certainly published a lot before then, but started keeping up with it in 1990.

Q. Of those 600 manuscripts since 1990, how many have concluded that smoking is adverse to your

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health?

A. I -- none have concluded that. They have referenced the work in the literature that have concluded that, but that was not the conclusion of the studies. The conclusions were if this or that is relevant to risk of disease, then these products have these following relevance to that understanding and to that problem. There are a lot of those out there.

We don't have -- as I said earlier, we don't have the models to determine what in a cigarette makes it unsafe or what in a cigarette makes one cigarette safer than another. We have generalities. We have general trends.

I have a collection of literature where critics have told us what to do as an industry. We have tried to respond to that to the best of our ability using our toxicologists, biologists, chemists and product developers. We've got a great group and we've been working our butts off to do it.

Q. And you cannot determine what in a cigarette makes it unsafe?

A. Because there is no way to measure it, as I've said earlier.

Q. Do you accept --

A. I wish there were.

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Q. Do you accept the proposition that cigarettes are unsafe?

A. As I said earlier -- when you asked me that earlier today, they may be.

Q. How long has Reynolds known that?

A. I don't know how long Reynolds has known that.

Q. Since you joined?

A. Those who preceded me that I got to know -- Rodgman, DiMarco and others -- have certainly said, you know, "Cigarettes may well be unsafe and what can we do about it?" How long that was a mind set around here? I don't know. I'm not a historian so I couldn't help you with that. I'm just not -- you know, I've never been interested in that. DuPont, Rohm & Haus, the National Tox Center and any other place I've worked, I'm not a historian or interested in it.

Q. Since 1984, though, it's your belief that Reynolds has known that cigarettes could be or are unsafe?

A. Could be. Since when? 1984?

Q. Yes.

A. Yeah. Yeah, they may be.

Q. And that's just not your belief, that's also Reynolds' belief?

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MR. BELASIC: Well, objection. Dr. Burger doesn't speak for Reynolds. You served us a 30(b)(6) deposition asking for a corporate representative on that issue who would speak for Reynolds. We produced him. He was Dr. Sam Simmons. You took his deposition for two days.

MR. MAISTROS: I did?

MR. BELASIC: You -- plaintiff's counsel and the 60 law firms that represent the plaintiffs in this case. One of those.

Q. In 1984, were you part of management at Reynolds?

A. I was director of toxicology, as I testified earlier.

Q. Did that qualify you as management?

A. Yeah.

Q. So since --

A. But I'm not the manager. I'm part of the management -- still am part of the management at Reynolds.

Q. You were part of management from 1984 to the present, correct?

A. That's correct.

Q. Do you know if Reynolds had as any of its written corporate goals to produce a, quote, "safer,"

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unquote cigarette?

A. It had as its goals to produce cigarettes with less biological activity, less toxicity, less chemistry of concern, less compounds of concern in smoke. It did not have as part of its goals to produce cigarettes that were safe or not unsafe. Because they knew then as we know now, we don't have an agreed upon way to measure that.

And by the way, in the last three or four years as we've interacted more and more with critics of the tobacco industry, we've gotten to know them better. Some of them even think they're friends of ours, I guess. We keep asking, "How can we get some closure on bioassays to measure progress?" And they all agree it needs to be done, but they don't know how to reach that consensus or find that battery of tests. It's as I said -- and I don't criticize them for that -- it's complicated.

THE VIDEOGRAPHER: Mr. Maistros, we have five minutes left on the videotape.

Q. Okay. Do you know if Reynolds has since 1984 ever attempted to increase the sale of its cigarettes by increasing the numbers of nonsmokers -- I'm sorry. Let me start over.

Do you know if since 1984 Reynolds has

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ever made any effort to increase its overall sale of cigarettes by getting nonsmokers to start smoking?

A. Absolutely not.

Q. So it's never been a corporate goal of Reynolds to get nonsmokers to begin smoking?

A. Not that I'm aware of.

Q. Has it ever been a corporate goal of Reynolds to get smokers to increase their smoking?

A. No, it has been our goal to steal our competitors' smokers.

Q. Smokers -- Reynolds has never had it as a goal, then, to obtain new smokers in the sense of people who have not smoked before?

A. Not that I'm aware of.

Q. That's true in America or overseas?

A. I assume so. I don't have as much interaction with business objectives in our Tobacco International group, so I can't speak for them. But I seriously doubt that's our goal.

Q. So Reynolds is not concerned with the fact that people who do not now currently smoke are not going to become smokers as a result of their marketing efforts?

A. I don't know how to answer that question. I can only say that whoever -- whomever chooses to

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smoke, we obviously want to be competitive and get him to smoke our brands.

Q. Is Reynolds interested in getting those people who choose to smoke to continue smoking?

A. If they want to continue smoking, we want them to use our brands. And that's the long and short of it.

Q. Is Reynolds interested in getting those people to continue to smoke, if they choose to smoke?

A. If they choose to smoke, they've already decided to continue. So our interest is to capture their brand loyalty. We don't have any plans or any programs, research or testing to talk people into continuing smoking. That's not part of our objectives. Our objective is for people who chose to smoke, let's give them what they want so they will smoke our brands.

Q. And hasn't it always been a goal of Reynolds, at least since you've been there, to reduce the alleged adverse social claims related to smoking?

MR. BELASIC: Object to the form and the use of the term "adverse social claims."

A. Adverse social? Is that what the word was?

Q. Isn't it true that it has been a goal of Reynolds, at least since you've been there, to reduce

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the decline in the social acceptability of smoking?

A. (Witness moves head from side to side.)

Q. Would you agree with the proposition that --

A. I'm still trying to deal with the question.

Q. Let's start over. Do you agree with the proposition that there is a segment of the population out there that we'll call society that does not accept smoking as a function?

A. Acceptable habit.

Q. Social acceptable habit?

A. There's a segment of our society certainly that does not accept smoking as a acceptable habit.

Q. And hasn't Reynolds' goal been, since at least you've been there, to reduce that segment of society?

MR. BELASIC: Same objection. He's a fact witness. I haven't designated him as a 30(b)(6) corporate representative on Reynolds' policy in any area, let alone this area.

MR. MAISTROS: You can object.

A. Our goal has been to give smokers what they want in a cigarette. Since I've been at Reynolds and any time I know of before then, we have not targeted nonsmokers for acceptance of the habit of smoking in

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others.

We have certainly tried to develop cigarettes. We have one in Japan called Pienissimo and we have Eclipse and we have Premier here for smokers whose family or friends object to environmental tobacco smoke. That's the closest I know of, of anything remotely resembling trying to get nonsmokers to quit complaining to smokers.

MR. MAISTROS: Okay. We're going to have change the tapes.

THE VIDEOGRAPHER: We're going off the record at 4:56 p.m.

(SIGNATURE RESERVED.)

(DEPOSITION ADJOURNED AT 4:56 P.M.)

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JURAT

I, GARY BURGER, do hereby certify that I have read the foregoing transcript of my testimony, Volume I, taken on August 21, 1997, and have signed it subject to the following changes:

PAGE	LINE	CORRECTION
See attached 2 page errata sheets		

Gary V Burger

DATE: 10/13/97

Sworn and subscribed to before me on this 13th day of October, 1997.

NOTARY PUBLIC: Carol P. Holland

OFFICIAL SEAL
CAROL P. HOLLAND
Notary Public-North Carolina
COUNTY OF FORSYTH
My Commission Expires
February 27, 2000

STATE OF NORTH CAROLINA

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COUNTY OF DURHAM

C E R T I F I C A T E

I, Cathy Jones, a Notary Public in and for the State of North Carolina, do hereby certify that there came before me on August 21, 1997, the person hereinbefore named, who had been previously sworn to testify to the truth and nothing but the truth of his knowledge concerning the matters in controversy in this cause; that the witness was thereupon examined under oath, the examination reduced to typewriting under my direction; and the transcript is a true record of the testimony given by the witness.

I further certify that I am neither attorney or counsel for, nor related to or employed by, any attorney or counsel employed by the parties hereto or financially interested in the action.

IN WITNESS WHEREOF, I have hereto set my hand and affixed my official seal, this the 3rd day of September, 1997.

CATHY JONES, NOTARY PUBLIC
My Commission Expires: 1-18-99

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Deposition for Gary T. Burger
Arch vs. American Tobacco Company, Inc., et al.
Thursday, August 21, 1997
Volume 1

PAGE	LINE	CORRECTION
5	3	D.V.M. (instead of *Ph.D.*)
14	6	4-Aminobiphenyl (instead of *Four aminobiphenyl*)
14	24	4-Aminobiphenyl (instead of *Four aminobiphenyl*)
14	25	4-ABP (instead of *4ABP*)
17	18	disciplined (instead of *discipline*)
17	20	4-ABP (instead of *4ABP*)
17	25	4-ABP (instead of *4ABP*)
20	22	mellitis (instead of *melitis*)
21	22	DMBA may not be considered (instead of *DMBA is not considered*)
25	8	"Telomers" (instead of *telemers*)
26	14	pathologist (instead of *pathology*)
30	12	contracted (instead of *contract*)
30	14	stand-alone (instead of *standalone*)
39	24	Hardin (instead of *Harden*)
62	5	Moonlight (instead of *moonlight*)
62	7	Doral (instead of *Dural*)
67	15	Slade (instead of *Slate*)
81	16	Fisher exact test (instead of *fish are exact*)
86	17	They may be (instead of *There may be*)
86	25	From 1980's (instead of *From 1980*)
92	6	D.V.M. (instead of *Ph.D.*)
97	25	keeps (instead of *gets*)
100	14	Von Ark (instead of *Von Arx*)
106	23	to any and every (instead of *any every*)
125	12	Inveresk (instead of *Inverest*)
126	8	biology (instead of *biological*)
134	21	cast (instead of *cash*)
135	15	David (instead of *Davis*)
136	16	mat (instead of *map*)
136	24	lose (instead of *use*)
138	12	cast (instead of *cash*)
141	11	Doral (instead of *Dural*)
141	12	A little (instead of *Little*)
146	17	KDN (instead of *KDS*)
150	6	cast (instead of cash)
157	3	1,3-butadiene (instead of *1-3-butadyne*)
175	14	metanicotine (instead of *matanicotine*)

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PAGE	LINE	CORRECTION
176	22	D.V.M. (instead of *Ph.D.*)
180	19	Doolittle (instead of *Dolittle*)
181	1	Doolittle (instead of *Dolittle*)
185	3	alumina (instead of *lumina*)
187	11	prove (instead of *improve*)
189	13	Doolittle (instead of *Dolittle*)
189	14	Randerath (instead of *Randeraff*)
190	4	Cline (instead of *Klein*)
192	15	Dr. Chin Lee's (instead of *Dr. Chin's*)
192	16	Doolittle (instead of *Dolittle*)
192	22	urine (instead of *neuron*)
192	23	Doolittle (instead of *Dolittle*)
192	25	urine (instead of *neuron*)
197	24	Catawa (instead of *Catalpa*)
206	19	tumorigenicity (instead of *tumor genecity*)
224	13	Doolittle (instead of *Dolittle*)
226	4	Weber (instead of *Webber*)
234	9	Ames, SCE, chrom abs (instead of *Ames SEE's chrome labs*)
236	12	Delete question mark (?) at end of sentence – should be a period (.)
237	17	reduced (instead of *released*)
247	17	Weber (instead of *Webber*)
251	14	tar (instead of *far*)
261	3	Pianissimo (instead of *Pienissimo*)

Signature: Gary V Barger

Date: 10/13/97

Subscribed and sworn to before me this 13th day of October, 1997

Carol P. Holland
Notary Public

My commission expires: February 27, 2000

OFFICIAL SEAL
CAROL P. HOLLAND
Notary Public-North Carolina
COUNTY OF FORSYTH
My Commission Expires
February 27, 2000

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LAWYER'S NOTES

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IN THE UNITED STATES DISTRICT COURT

FOR THE EASTERN DISTRICT OF PENNSYLVANIA

CIVIL ACTION NO. 96CV-5903

STEVEN R. ARCH, WILLIAM BARNES, CIARAN McNALLY, CATHERINE POTTS, NORMA RODWELLER, BARBARA SALZMAN, EDWARD J. SLIVAK and JOHN TEAGLE,

Plaintiffs,

vs.

THE AMERICAN TOBACCO COMPANY, INC., ET AL.,

Defendants.

CERTIFIED COPY

Deposition of

GARY BURGER

VOLUME II

CONFIDENTIAL

TRANSCRIPT of testimony as taken by and before CATHY JONES, Shorthand Reporter and Notary Public of the State of North Carolina, at the law offices of Womble, Carlyle, Sandridge & Rice, 200 West Second Street, 12th Floor, Conference Room 12-A, Winston-Salem, North Carolina on Friday August 22, 1997, commencing at 9:07 a.m..

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I N D E X

WITNESS	DIRECT	CROSS	REDIRECT	RECROSS
GARY BURGER				
Maistros	5			
Knisely	123			

E X H I B I T S

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5	5-11-83 project outline in re smoke component dose (2 pages)	56
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7	Letter to DiMarco with attached position paper (7 pages)	77
8	4-14-94 statement of Reynolds before U.S. House of Representatives Committee on Energy and Commerce Subcommittee on Health and the Environment (29 pages)	113
9	Lists of research department memorandums (383 pages)	182
10	12-15-93 Report No. ATP 93-351 (7 pages)	189

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STIPULATIONS

Before testimony was taken, it was stipulated by and between counsel representing the respective parties as follows:

1. That any defect in the notice of the taking of this deposition, either as to time or place, or otherwise as required by statute is expressly waived, and this deposition shall have the same effect as if formal notice in all respects as required by statute had been given and served upon the counsel in the manner prescribed by law.

2. That this deposition shall be taken for the purpose of discovery or for use as evidence in the above-entitled action, or for both purposes.

3. That this deposition is deemed opened and all formalities and requirements with respect to the opening of the same, expressly including notice of the opening of this deposition, are hereby waived, and this deposition shall have the same effect as if all formalities in respect to the opening of the same had been complied with in detail.

4. That the undersigned Cathy Jones, Certified Court Reporter and Notary Public, is duly qualified and constituted to take this deposition.

5. Objections to questions, except as to the form thereof, and motions to strike answers need not be made during the taking of this deposition, but before any judge or any court of competent jurisdiction for the purpose of ruling thereon, or at any other hearing or trial of said case at which said deposition might be used, except that an objection as to the form of a question must be made at the time such a question is asked or objection is waived as to the form of the question.

6. That the signature of the witness to the deposition is hereby not waived.

7. That the Federal Rules of Civil Procedure shall control concerning the use of the deposition in court.

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GARY THOMAS BURGER, D.V.M.,

having been previously sworn, was examined and testified as follows:

THE VIDEOGRAPHER: This is day two, tape four of the videotaped deposition of Gary Burger, Ph.D.. We're going on the record, Friday, August 22nd, 1997 at 9:07 a.m..

CONTINUED DIRECT EXAMINATION

BY MR. MAISTROS:

Q. Good morning, Doctor.

A. Good morning.

Q. How are you?

A. Just fine.

Q. I want to clear up a couple of things. Maybe I have my dates or notes wrong and you can take me through it, if it will be quicker. From '84 to '90, you were director of toxicology?

A. That's correct.

Q. And from '90 to '92, you were vice president of advanced technical products?

A. That's correct.

Q. How did your functions differ, if any, from '90 to '92?

A. At that point in time I had left the discipline of toxicology at R. J. Reynolds and molecular biology

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group, and had come over to basic product research and product development. So the difference was I got more into product research and product development and out of the disciplines of toxicology and molecular biology.

Q. How many people did you supervise from '90 to '92?

A. About a 110 to 120.

Q. And those people were looking at both existing products and new products?

A. That's correct.

Q. Were they looking at health issues related to existing products?

A. They were looking at issues around products that health scientists had pointed out and suggested ought to be changed about the product. So there was an indirect connection to health issues around cigarettes.

Q. What was the majority of your group's work in the '90 to '92 time frame concentrated on?

A. Concentrated on -- there were a number of projects that I can list for you. They concentrated on cigarettes that heat tobacco like the successors of Premier, prototype speaking, and the predecessors of Eclipse. That was a major effort. They looked at

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developing cigarettes that had less sidestream smoke and less environmental tobacco smoke coming from them.

They looked at products that talked about yesterday that health officials in Europe and especially in London -- excuse me, England and Germany said ought to be developed. Those low TN products. We referred to them as satisfying ultra low tar products, ones that smokers would say taste as good as lights.

We also worked on what we called a cigarette that burns down that had at least 70 to 90 percent of the properties of Premier. In other words, a cigarette that burns tobacco but has chemistry similar to Premier. We couldn't expect to duplicate Premier when you burn a lot more tobacco, but we wanted to get as close as possible.

And let's see -- that covers it. That covers it. I can think of the major categories, and I believe that's them.

Q. When you were looking at how to develop a low tar nicotine product that satisfied the smoker's taste, did you look at the issues of how to better control nicotine in the end product?

A. No, what we looked at is how to provide a low

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TN product which is lose less nicotine through processing, lose less organic acids, lose less water soluble materials while continuing to keep the tar yield in the ultra low tar area.

Q. So you were looking at ways that in the manufacturing process, you would lower the tar in the end product, but not lower the nicotine?

A. Not lower the nicotine as much.

Q. And what methods did you come up with to do that?

A. Well, that's -- we talked about the levulinic acid yesterday, but we explored and we patented this by the way. It's in the patent literature. We explored ways to take the solids away from tobacco like burley and leave the water solubles and reapply them to other tobacco. These were water suspensions. And used -- you asked me about levulinic acid yesterday. Use acids that are natural in tobacco like levulinic acid to see if that would keep such products from being too harsh.

Q. The concept of taking solids away from the tobacco and applying water solubles to other tobacco, was that ever used commercially?

A. No, never.

Q. During the process you talked about

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yesterday of reconstituted tobacco, isn't the water soluble sprayed back onto the tobacco sheet at some point in the process?

A. It's water-bathed back, not sprayed back. It's recirculated.

Q. There's no reconstituted tobacco that Reynolds has ever sold commercially where water solubles are sprayed back on the tobacco?

A. Depends on what you mean by the word -- our reconstituted sheet, and probably everyone else's, reapplies the water. Does that mean spray it? I don't know if you would look at how the water drips back on it, if that's it a spray or a drip. But in the end you lose -- through that recirculating water application, you use 30 percent of the water solubles or thereabouts.

That is our standard G-7. The purpose of that is to make a good sheet that can cut well and to get the benefits that have been described by the NCI and others of reconstituted sheet -- lesser biological activity and lesser chemistry.

So that is -- Reynolds was one of the pioneers in that area. It's been published and patented and it's a standard operation. We do not -- as I said yesterday -- to my knowledge and I don't believe it

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exist -- ever have a G-7 sheet where we target nicotine levels.

And you've got to understand that it's not just nicotine that you lose; any water solubles from that reconstituted sheet process. Obviously nicotine is a point of interest from the controversy surrounding it since the early nineties, but that process was developed to decrease the mass of tobacco used in cigarettes.

Q. And the ammonia that's used in the G-7, it's your understanding that that is used for what purpose?

A. As I stated yesterday, diammonium phosphate at .2 and lesser levels are used to improve the integrity, the cutability, the resilience of the reconstituted sheet and to control or make uniform the burn rate. There are people, as I stated yesterday, that think it might help taste, but we have not been able to prove that. So it's a hypothesis that's been unprovable.

Q. Doesn't Reynolds also make reconstituted tobacco that does not contain ammonia? And haven't they always in the past?

A. I believe -- I'm not a very good historian as to the history of G-7. There are others you could

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talk to at Reynolds that would be much better than myself. But there are G-7 sheets without diammonium phosphate, that is true.

Q. And hasn't that --

A. And there are those with it.

Q. Hasn't that been true since 1984?

A. I don't know how long it's been true. My impression -- but it may be incorrect -- is that diammonium phosphate in its utility may have come later than that, but I don't know.

Q. Do you know if diammonium phosphate was first used by Reynolds as a result of suspicions that Reynolds had that Phillip Morris was using it?

A. I don't believe that was the initiating factor in using it. I never heard that if it was.

Q. What is the de-nicatinization? Is that how you pronounce it?

A. It's a -- there's a process that I referred to yesterday that we used to have was called burley de-nic or KDN. "K" stands for burley and "DN" for de-nic. As I stated yesterday, we had a few tools to deal with a crop year or a component of a crop year that was higher nicotine than we needed. Burley is the typical leaf that will suffer from being out of the range of the nicotine you want.

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So in those days, up until the mid to late eighties, we occasionally used the de-nic process to take nicotine away from leaf, not add it. That process is similar in G-7 as it is there. But the difference is that the G-7 process uses a water kind of process. The KDN would use ammonium compounds to extract, not add, nicotine -- as I understand it. I am not an expert on the KDN process.

Q. So in the de-nic process, ammonia is applied to the tobacco, correct? With a water solution or just straight?

A. It's in a -- it's in a water environment, high humidity environment. I don't know what form of ammonia was applied back then, but it was applied to get nicotine out of the process.

Q. And then the tobacco is dried?

A. The tobacco will have been heated. Its moisture content might have been the same -- maybe less, but I think it was about the same. When it came out of the tunnel and when it went into the tunnel, it's my understanding that the moisture was very similar.

Q. And what about the water solubles that were washed away from the tobacco as --

A. It was discarded. It was done away with.

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Q. What fashion?
A. In some water waste fashion, but I don't know. I know it was closely monitored by our environmental engineers, but I don't know what the exact process was.
Q. And it's your understanding that the -- there is no similar de-nic process being utilized by Reynolds today?
A. No, there's not.
Q. When did they stop de-nicotinizing tobacco?
A. When we learned other ways to blend and control for the leaf with the nicotine ranges and the tar ranges we wanted. They found better ways to do it and you didn't have to have a -- you know, a tunnel and the manpower to run that tunnel. It was a very cost-effective change in my view. Plus we, I believe, got better at buying leaf as a company.
Q. Was the sole purpose of de-nic to reduce high nicotine content leaf?
A. Yes, as far as I know.
Q. And you found other ways to do that?
A. We found other ways to get the range of tar and nicotine in the leaf. They are not de-nic processes.
Q. Well, wasn't the de-nic process related

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solely to the nicotine?

A. Yes. As I stated, if we had part of the crop year that we bought higher than burley nicotine than we needed, we would use that process to bring it down to an average level.

Q. And you found other ways to affect the nicotine levels in the tobacco?

A. We found other ways to get the range of tar -- i.e., solids -- and nicotine that we wanted.

Q. Why do you keep putting in tar and nicotine --

A. Because --

Q. -- in the other ways in the de-nic process related solely to nicotine?

A. Because the -- it's very simple why I keep putting it in. They turned out to be tools that Reynolds used even when we had the KDN process for controlling blends in tar level. Those same tools could be used to control nicotine as well as tar.

That's why I keep adding -- putting them together. They're the same approaches. We just got better at it, better at purchasing our leaf, better at understanding the nuances of blending it so that we stayed in spec.

Q. But the de-nic process had as its primary

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purpose the control of nicotine levels, did it not?
A. KDN -- the purpose and the goal of the KDN process was when we had burley tobacco that was too high in nicotine to bring it down to average levels.
Q. Okay. Do you understand my question?
A. And I answered it very well, I think.
Q. It's a "yes" or a "no." Wasn't the primary purpose of KDN to affect nicotine levels?
A. To lower nicotine levels. That was the purpose of the KDN process, to lower nicotine levels -- the only purpose of it.
Q. And what was the primary replacement process that was used when you stopped doing the de-nic process?
A. Better control of the tobaccos we purchased. Better knowledge of their nicotine, sugar, tar yields. Better understanding and better controls of blending burley, flue-cured and Turkish, reconstituted sheet and puff tobacco. Just better understanding, better discipline, better control of it. There was no -- to my knowledge, and I believe I would have known it if it was going on, there was no de-nic process or nicotine control process that replaced KDN or any other thing.
Q. To your knowledge as you sit here today,

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in the '84 to '97 time frame, you know of no efforts by Reynolds to control the nicotine levels in its cigarettes?

A. As I stated yesterday, the only thing that comes to mind is when we were developing Eclipse, what sort of top-dressings do we use in the tobacco in Eclipse that allows you to get taste? That would include organic acids, nicotine, vapor phase components -- includes all of it. That's the closest thing we knew and know that cigarettes that heat tobacco have to be in a certain range of wet TPM delivery, nicotine delivery and flavor delivery, which includes nicotine.

Q. So --

A. So that's the closest thing I know of where we get concerned about the yield. We don't control it. We blend that tobacco and process it such that we have a good target of all of those things -- sugars, alkaloids including nicotine, tar, wet TPM in the case of tobacco heating products. And the gas phase components that I discussed yesterday that we believe are important for taste.

Q. When you were using the de-nic process, what percentage of your typical brands would have de-nicotinized tobacco in it?

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A. As I understand it, a very low percentage because in the eighties, the crop -- the leaf we were buying didn't have as often a high nicotine content. So when I arrived here, the KDN process was often inactive. It just sat there.

If we discovered -- excuse me -- if we discovered any -- as I understand it. I didn't go over there and watch. If we had a lot of burley tobacco that was high in nicotine, we fired up the KDN facility. But the engineers as early as '87 and '88 were arguing that we needed to tear down the process because we weren't using it very much.

Q. Do you know what percent of de-nic was put into Reynolds cigarettes at any given time?

A. No.

Q. Did it ever approach ten percent?

A. I don't know. I don't know what percentage it was. Sorry.

Q. 20 percent?

A. I don't know. I really don't. I would suspect based on its inactivity since I've been here always less than ten percent, but I don't know. You'd have to ask the engineer or production people that question.

Q. Would David Isbister know if Reynolds was

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controlling tobacco when he was employed at Reynolds?
A. Controlling tobacco?
Q. Controlling nicotine, I'm sorry.
A. Since they weren't, I doubt that he knows it.
Q. Would it surprise you if I told you that he testified under oath that absolutely they were?
A. Yeah. I don't know what he meant by that if he said that under oath. What did he mean by "controlling," quote-unquote, nicotine. It doesn't surprise me that he might have described a process like I did yesterday where the nicotine follows the tar. He may have felt like the nicotine de-nic process we talked about, the burley de-nic, was an example of that.
Q. It wasn't limited to that.
A. Well, you asked me if I was surprised and my answer is, you know, speculating where he may have been coming from, but I don't know. He was over R & D and other facilities, but his knowledge of the products and what was going on at that time -- I don't know how knowledgeable he was.
Q. Was he above you?
A. He was above Bob DiMarco who was above me. Yes.
Q. Were you aware that he was also at some

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point in his career manager of tobacco manufacturing plant at Reynolds?

A. I had heard that part of manufacturing was under engineering and something else, but I don't know the details.

Q. Were you aware that at one point in his career he oversaw all of the manufacturing facilities at Reynolds?

A. No, I wasn't aware of that, but that -- my only interaction with Dave Isbister is '90 to '92 time frame thereabouts. I knew him in '89, but my close interaction with him was '90 through '92.

Q. And what type of interaction did you have with him?

A. Primarily on the -- what turned out to be the Eclipse project. That facility was under R & D, which made it under Dave Isbister. And most of my interaction with Dave Isbister was regarding the tobacco heating cigarettes in our research and testing and facilities. That facility was under me. It was called operations development and Dave was my boss's boss.

Q. Are Eclipse, Premier under some sort of category of research related to safer cigarettes?

A. They are in a category of advanced technology

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products that address smoker concerns including environmental tobacco smoke and reducing the chemistry of cigarettes. In that regard, they have the potential to be related to cigarettes with less risk, and I certainly hope they are. And I believe they have tremendous potential for that, but I can't prove that they are.

Q. And yesterday when we were talking about cause and effect and the diseases you believe may be caused by cigarette smoking, the three that I think you said you felt comfortable with were lung cancer, emphysema and cardiovascular disease, but the other ones you had questions on?

MR. BELASIC: Objection. It misstates his testimony.

Q. Is that fair or not? It is what it is. I just want to get to my next point. Is that fair?

A. No, I said I had less comfort with cardiovascular disease as may be causing -- all of those may be caused by cigarette smoke. Of those three, I said cardiovascular disease was the most misunderstood or under -- not understood area. The other diseases we talked about like bladder cancer and laryngeal cancer I said may be caused by cigarette smoke. I didn't say they were not. I said

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they may be.

Q. Do you believe it's more likely than not that cigarette smoking is the cause of lung cancer?

A. I don't know because lung cancer is a multi-factorial disease. And how much of a role smoking plays in the onset of lung cancer, I don't know and I don't think anyone else does. It's a rational thought process to assume that it's one of the most important factors. I don't debate that. But how much of a role it plays, I simply don't know.

Q. I'm not looking for 90 percent. Do you think it's more likely than not that lung cancer is caused by smoking cigarettes?

MR. BELASIC: Objection. It's asked and answered.

A. I'd say what I said before. It may. In some people, it may be even a probability. It's plausible, but I don't know. And I don't know in whom it would be.

Q. Now, yesterday you talked about insofar as ingredients were concerned, that one of the things that Reynolds does is they review the literature on ingredients to determine what's out there in terms of possible adverse effects, correct?

A. Correct.

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Q. And I believe you said that you did that on products that had been in use before?

A. That's correct.

Q. Was that in use before with cigarettes or just in use in the industry?

A. Both. Well, I should have waited until you finished your question. Both what's used in this industry and in industry in general, in the literature.

Q. Well, the literature doesn't tell you what effects burning of those ingredients will have on health, does it?

A. Some of it does. You have to understand that candies, pastry, bakery products -- they burn their products in manufacturing them. We don't burn our products in manufacturing, but the consumer burns our product using it.

Q. Well --

A. But they bake or cook or heat treat their goods prior to selling it to the consumer. So they have some of the similar concerns that we have.

Q. Do they test their products to see what effects burning them at the temperatures that occur during the cigarette smoking process have on those additives?

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A. I don't know. If it needs to be done, we do it for our additives. I don't know what the food industry temperature profile is in their testing. I would assume it's lower, but I don't know.

Q. Unless you have literature review on ingredients that duplicates the temperatures that those ingredients reach when they are smoked and burned in cigarettes, the literature doesn't tell you a whole lot, does it?

A. If and when it doesn't tell us a lot on a given ingredient from the tobacco literature or any other literature, then we check and see what other companies may have done, what we have done. And if there is a data gap, we generate that information ourselves.

Q. So you do not believe it would be safe for a company including Reynolds to put an ingredient in a cigarette before testing is done to determine what effect heating that ingredient has on that ingredient?

A. I don't believe we put an ingredient in our product unless such testing has been done or similar work has been done and we're aware of it. And at the same time, we have a panel of experts who have evaluated the ingredients industry uses -- ours and

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anyone else's. And ingredient by ingredient with the full knowledge that it's pyrolyzed when the cigarette is burned and with the full knowledge of the data that's there because they provided to it, and the full knowledge of the work we've done in-house. They're aware of all of that when they make their conclusions. If they tell us that a product is problematic or an ingredient is, we don't use it.

Q. Who is they?

A. The committee I'm referring to.

Q. What's the committee called?

A. We refer to it as the ingredients and additives committee in-house. I don't know what their official name is, but they are outside experts. Among the best toxicologists in this country, if not the world. Top-named people, textbook writers, well known in their areas.

Q. And how long --

A. Unassailable as to their quality and their background.

Q. And how long have they been in existence?

A. I don't know, but I'd say at least five years. But I don't know.

Q. And what --

A. Bob Suber would have to be who you ask about

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that. He's the one that interacts with that committee.

Q. And what did Reynolds do to achieve the same level of test and safety measures prior to five years ago with respect to additives and ingredients?

A. We used -- instead of a formal committee, we used consultants and people that have worked with FEMA, which is what the food industry that you asked me about earlier uses. We used our expertise. We still use our own expertise. Some of our people were officers in the GMA, who deal with these kind of issues all the time. We specifically hired people who deal with these kind of issues in their previous jobs. So we use in-house and consultants from out of house.

Q. And I assume you're talking about from '84 on since you're not a historian?

A. Yes. And as I understand it -- and I met some of them when I got here, we had consultants prior to that. So I don't know when or how long that process was in place. You'll have to talk to someone who worked at Reynolds longer than I.

Q. How many different chemicals are in tobacco before it's heated?

A. I don't know. You'd have to ask a tobacco

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chemist.

Q. How many chemicals are in tobacco after it's heated?

A. Well, the literature claims that in smoke, not tobacco, there are three to five thousand chemicals.

Q. How many of those have been tested?

A. Our chemists do not dispute that.

Q. How many of those have been tested by Reynolds?

A. Some have been looked at by Reynolds in terms of trying to develop assays, but I don't know how many. We look at whole smoke. As I talked about yesterday, what is the relevance of an individual component when it's in a complex mixture? So we focus most of our attention on the whole smoke.

Q. So you don't see any relevance of testing individual ingredients or compounds?

A. Limited relevance because it's a well-known premise in toxicology, compounds in a mixture do not act like compounds alone. That's well known. That's taught in Toxicology 101. It's also taught in medical schools and pharmacology. It's a fact of life.

Q. So the more relevant inquiry is the composition and make-up of the compounds in the whole

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smoke as opposed to individually?

A. In my opinion, yes.

Q. And to determine the safety of those compounds in the whole smoke, the whole smoke should be tested?

A. To determine its toxicity, its biological activity, whole smoke should be looked at. You might, for whatever reason, look at an ingredient or a particular smoke compound. That's nothing I would criticize, but your emphasis should be on the whole smoke in my opinion.

Q. When did Reynolds to your knowledge first start testing the toxicity of the whole smoke?

A. It preceded me. I don't know when it began. It was definitely before 1984. As I stated yesterday, they had a short-term test in-house and they would on occasion contract work out of house. Especially skin painting studies.

Q. What does the literature tell you about the health effects related to inhaling the various ingredients and additives?

A. From time to time you see in the literature speculation about what certain smoke constituents may mean. Last year there was an article on -- on a polycyclic aromatic hydrocarbon. The acronym is

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BPDE -- that an individual -- I forget where they were -- published. The press picked up on it and talked about it as if it was BAP in smoke. This compound is not in smoke. It could be one of the metabolites of BAP, but in the body, who knows?

But there are instances like that where specific smoke components are studied by themselves or a surrogate -- in that case, it was a surrogate -- and it appears in the literature. We read it and talk about it and evaluate it and see what's going on.

And in that particular instance, the press immediately ran to us for comment. And what we said was what the investigator himself said at two national meetings later. It was not a smoke study and it was not on a compound in smoke. It was a member of a class of compounds that BAP belongs to. What he said, and I quote -- unlike the press -- "My studies are not relevant to smoking. They are merely a study of a polycyclic aromatic hydrocarbon and how it interacts with DNA."

Q. Okay. You reviewed literature before you use ingredients at Reynolds, correct?

A. Yes.

Q. What does the literature tell you about

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the health effects of inhaling ingredients?

A. Well, it's like the example I just stated. You will find some citations in the literature talking about what may be the ramifications of smoke contained in those compounds. We talked about 4-ABP. Some work I did with a team of researchers, 4-aminobiphenyl at the National Tox Center, was published in somewhere around 1985, early '86. I did not get to see the final manuscript, but the publication with my name on it speculated what the existence of 4-ABP in smoke might mean.

It was speculation and it was very evident it was speculation. It was not proof positive. It had no way to determine exactly how interactions between tissues and cells with 4-ABP relate to the smoker and 4-ABP in the smoke. It was clearly a statement of the limitations of the study, but speculation on its impact.

Q. Wasn't your name on that article?

A. Yes.

Q. Did you write them and tell them to take your name off the article?

A. It was published before I knew it. They were -- I had written them and talked to them about, "Let me see the manuscript before you publish it, if I'm

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going to be an author. If I'm not, publish it without my name on it." When it came to Reynolds, I looked at it and I thought it was okay, but I was provoked that they had not passed the final draft or the rough draft by me.

And I called up the toxicologist's boss, who's -- and I told him, "Don't do that again. It's discourteous and inappropriate for any scientist to be an author and not see the final manuscript." But I didn't have a problem with the manuscript.

Q. And what was the title of that manuscript?

A. It was -- I don't recall. It was toxicity -- "Chronic Toxicity of 4-Aminobiphenyl." The study was two -- based on a study of two to four thousand. I forget the exact number. Somewhere around four thousand rodents, mice, with 4-ABP given in drinking water, I believe it was, and the incidence of liver tumors and bladder tumors in those two strains of mice, but I don't remember the title.

Q. And what was the conclusion of that manuscript?

A. That 4-aminobiphenyl in those strains of mice had a similar metabolic pattern to workers who were exposed to 4-ABP in the dye industry. And that the

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incidence of bladder tumors were similar to and indicative of what occurred in some of the people who worked in the dye industry.

But the liver tumor was a paradox -- and you know, this is years ago. I did the work in 1979 through '81, so my memory is suffering from details. But at the time we did it, we couldn't understand why the liver tumors we saw in mice were not part of the epidemiology of workers in the dye industry. They don't have an increased incidence of liver tumors, those people don't.

Later we found and others found that certain strains of mice are not good models for liver tumors because by the time they are two years of age, 45 to 55 percent of them have liver tumors that are not given anything. So when you look back, it's more understandable.

Q. Four-ABP is in cigarette smoke, isn't it?

A. Very small amounts.

Q. What work have you done since you've joined Reynolds to look at 4-ABP and its health effects on humans?

A. We've looked at 4-ABP in cigarette smoke and the efforts to lower it. We've used low-nitrogen blends because according to the literature, 4-ABP

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should be lowered in low-nitrogen tobaccos. We found that it was the same. It didn't lower it. So we've done some product development to lower it. The most successful way to lower it is heating tobacco and that lowers it probably 95 to 98 percent.

Eclipse and Premier are one good way to lower 4-ABP in cigarette smoke. We're looking at some other ways to do it. We have research on low CO filters and low gas phase filters underway to see if that would help. We're still trying in several ways to lower 4-ABP.

Q. And your work with the National Toxicology -- what is it, Institute?

A. NCTR, National Center for Toxicological Research.

Q. National Center for Toxicological Research. Were you familiar with the federal regulations and requirements with respect to additives that are used in foods?

A. Vaguely, not intimately.

Q. Are you aware of the concept that if a additive or ingredient is known to be carcinogenic, it shall not be used in foods?

A. Yes, and we use that concept in cigarettes. Reynolds does not allow mutagens or carcinogens to be

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used as added ingredients in cigarettes. And we built that on the basis of my FDA experience and Bob Suber's FDA experience. Used the same rules and the same policies.

Q. When was that implemented?

A. It may have been in place before we got here, but it's been in place since late '84. I don't know when it was in place. I know what has been the rule since we've been here.

Q. So since 1984, it's been Reynolds' policy that nothing shall be added to the tobacco product that is carcinogenic or mutagenic?

A. Yes, that's what we've attempted to do and I think done quite well. And I'm not saying it wasn't already in place, but what I have seen firsthand.

Q. Why have you attempted to follow that guideline?

A. We think it's a sound practice. Works for the food industry and we believe it works for cigarettes. Apparently the expert committee agrees.

Q. Which expert committee?

A. The one I referred to about 30 minutes ago. The additives and ingredients committee.

Q. Who's in charge of that today?

A. Bob Suber. He's in charge of our relationship

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with them. I don't know which gentleman is the chairman, but I believe Dr. Duel is -- John Duel is the chairman, I believe.

Q. Do you find it --

A. By the way, he's the editor of Casserett and Dole, which is one of the most well-known toxicology reference textbooks in the world.

Q. Do you find it somewhat ironic that Reynolds doesn't allow additives that are carcinogenic in its tobaccos, but sells tobacco with the end product being carcinogenic?

MR. BELASIC: Object to the form.

A. I don't find that ironic any more than the food industry to your reference has that in place as a rule of thumb for ingredients. And when you bake pastry, when you fry vegetables, when you grill meat, you produce carcinogens at higher levels than are found in cigarette smoke. I don't find it any more ironic than what takes place in the food industry --

Q. Do you inhale the pastry?

A. -- and in the ingestion of food.

Q. Do you inhale pastry?

A. You inhale the stove top and barbeque top and grill top when you do meat. And when you fry vegetables or meat or grill vegetables on the stove,

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you certainly inhale it.

Q. Are pastries made with the purpose and intent to inhale them?

A. No.

Q. Are cigarettes made with the purpose and intent to inhale them?

A. Cigarettes are made with the intention of providing smokers with the taste and pleasure that they want.

Q. The purpose --

A. Some smokers, believe it or not, don't inhale. Most do.

Q. What percentage of smokers do you think don't inhale?

A. I've heard estimates as high as 10 to 15 percent, but I don't know what the exact percentage is.

Q. As the cigarette is manufactured by Reynolds, isn't it the purpose of Reynolds to make a product which people inhale?

A. People smoke, many of which also inhale.

Q. And you --

A. We don't instruct smokers to inhale. We don't give them instructions on how to smoke. We give them instructions on Eclipse, how to light a cigarette.

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We don't tell them how to smoke it.

Q. Isn't it Reynolds' assumption that when it markets cigarettes, people will inhale them?

A. Yes. It's an assumption. It's a very valid one.

Q. Isn't it the cigarette designed with the purpose and intent that people would inhale them?

A. It's designed for the purposes I described -- for the smoking pleasure that they want from cigarettes. It is and always has been -- tobacco always has been from the Sir Walter Raleigh days and before, a product that people smoke and many -- most inhale. The use of tobacco for most people includes inhaling.

Q. Aren't the exact design specifications based upon an assumption that people will inhale the product?

A. The design specifications are based on smoking machine yields. Whether or not a given smoker inhales a cigarette has no impact on its specs at Reynolds.

Q. Are you going to try to testify to this jury that Reynolds does not intend to design its cigarettes for the purpose of having people inhale them?

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MR. BELASIC: Object to the form. His testimony is what it is. There's no need for the pejorative comment.

MR. MAISTROS: I don't know why we are fighting on this simple issue.

THE WITNESS: Yeah, I would like to ask you that. It's not worth fighting over. I've admitted that smokers usually inhale. I've told you exactly what our products are designed to do.

If you have a problem with the fact that our smokers inhale, but we don't design our products with the end point of inhalation in mind, I'm sorry. We design our products to provide smoking pleasure. And we use machine smoking yields to set our specs. That is what it is.

Q. What tests does Reynolds do on its additives to determine health effects related to inhaling those additives?

A. When we need to do tests on additives, we may -- depend on what's known about that additive, we'll do a range of tests that go from Ames cytotoxicity, sister chromatid exchange -- if need be, chromosome aberrations. Inhalation studies may be included. Respiratory irritation studies like the allergy test may be included. Skin painting may be

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included.

We do that based on what is known or not known about the ingredient. We take care of the ingredient as an inert or standalone in those tests and we look at in the animals, the whole smoke and the whole tobacco. We do comparative toxicology like I described yesterday. And if a product has the netted effect of adding biological activity or toxicity, it's not approved for use.

Q. What test does Reynolds do to determine the health effects related to inhaling its ingredients?

MR. BELASIC: Objection.

MR. MAISTROS: Inhaling its ingredients.

MR. BELASIC: Objection. It's asked for maybe the fifth time this morning, if not yesterday.

Q. I haven't heard a test yet. Inhaling -- what inhalation test does Reynolds do? Can you cite to any?

A. We have done and published inhalation studies in animals.

Q. On ingredients? Which ingredients?

A. We have done inhalation studies on ingredients. We looked at levulinic acid that we talked about yesterday by inhalation. It depends on what is known

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or not known about the ingredient and what needs to be evaluated. It's a case-by-case approach. Many times you do not have to do a pyrolysis test on the ingredient itself or an animal test. It depends on what has already been done or not done.

And I assure you the literature is full of, to your earlier point -- the literature is full of components of cigarette smoke by themselves and what their effects are. BAP is one example. Tobacco-specific nitrosamines -- there's just a roomful of articles on those and there are others. Therefore, it's something we don't often have to do -- a particular component or an ingredient. And we decide case by case what needs to be done before something is approved.

We don't have many new compounds that haven't been tested and reported in the literature or in our own documents. And when we come across something that's new, before we let product developers consider it, we do a lot of testing on it. How much we do depends on what's in the literature, including inhalation studies.

Q. Yesterday when we were talking about the role that nicotine played in smoking, it was your testimony that to your understanding, Reynolds had

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not done any research for the specific purpose of determining the role of nicotine in smoking. Do you remember that?

A. I remember stating that we do not do any particular studies on determining nicotine's role in addiction. I've certainly stated that we look at various cigarettes with various levels of nicotine and levels of sugars and levels of flavorants and different levels of tar and how consumers respond to that as to taste, mouth feel and satisfaction. But the role that I testified to that we don't have any test for because there is not one is what a, quote-unquote, addictive qualities nicotine has.

Q. So you didn't testify at any point yesterday that Reynolds didn't do research for the specific purpose of understanding the role that nicotine played in the smoking process?

MR. BELASIC: Objection. His testimony yesterday is what it is.

MR. MAISTROS: Well, I said it about 15 times yesterday by my recollection and count. Now, it's you did no specific --

THE WITNESS: I'm trying to understand what your question is.

MR. MAISTROS: Now, it's you did no

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specific research related to nicotine and addiction. Would you like to change your testimony?

MR. BELASIC: Object to the question. You're misstating his prior testimony and it's vague and ambiguous.

MR. MAISTROS: Which is vague and ambiguous? My question or his prior testimony?

MR. BELASIC: Your question.

BY MR. MAISTROS:

Q. Okay. Did yesterday not happen? Did you not testify yesterday at least six times that Reynolds did no research to determine the role that nicotine played in the smoking process?

MR. BELASIC: Same objection.

A. What I testified to yesterday and the way I just described and as I stated yesterday, there is no research that I'm aware of, ongoing or in the past, to determine addictive qualities of nicotine. There has been research going on that look at nicotine and other smoke constituents as to providing acceptance in consumers.

We talked yesterday about Dr. Lippiello's work when I first came here, trying to understood the physiology and receptor chemistry of nicotine and how that was the progenitor of the analog program we

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described. I talked yesterday about -- briefly about Wally Pritchard's work and trying to look at smoking, not nicotine, on the electrical patterns found in brain. On smoking, it's assumed nicotine has a role in that and a prominent role. But I don't know of Dr. Pritchard looking at inhalation of the nicotine aerosol by itself in that regard. He has looked at smoke.

We've looked at nicotine in the toxicology labs. I described Dr. Dave Doolittle's work yesterday where nicotine actually lowers the toxicity in some assays of cigarette smoke. I don't know what else we covered, but those were the primary things that we covered yesterday on nicotine research.

Q. Did you discuss your testimony yesterday with your attorney?

MR. BELASIC: Objection. It's attorney-client privilege.

Q. Did you discuss your testimony in any fashion with your attorney?

MR. BELASIC: Objection, and instruct the witness not to answer. It's attorney-client privilege.

MR. MAISTROS: Whether you talked to him? It would be wholly improper if you did. I assume his

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answer is going to be no. He's in the middle of testifying under oath in front of a jury. I assume you wouldn't talk to him about his testimony.

Q. Did you talk to him about his testimony -- to your lawyer?

MR. BELASIC: Instruct the witness not to answer.

MR. MAISTROS: You're not going to let him answer whether he talked?

MR. BELASIC: My objection stands, Counsel.

MR. MAISTROS: How is that privileged? Whether he talked to you?

MR. BELASIC: Whether he talked, sure.

THE WITNESS: Sure.

BY MR. MAISTROS:

Q. You talked to your attorney? Did you discuss your testimony? I don't want to hear the specifics. Did you discuss your testimony?

A. We discussed what may come up.

Q. Did you discuss what had transpired yesterday?

A. Very briefly.

Q. Did you discuss your testimony where you said that Reynolds had done no research for the

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specific purpose of understanding the role that nicotine played in the smoking process?

A. Not that specific question, no.

Q. Did you discuss that concept?

A. I don't believe so.

Q. Did you discuss the concept of controlling nicotine?

A. I remember asking him was your questions based on that premise. That was it.

Q. Do you remember me asking you yesterday if one of the goals of Reynolds' better understanding nicotine was to stop the decline in the social acceptability of smoking?

A. Not at all.

Q. Okay. Do you believe that it was one of Reynolds' goals in understanding nicotine to stop the decline in the social acceptability of smoking?

A. No, absolutely not. The social acceptability of smoking -- the only work that we have done is to try to develop cigarettes that offend people around them, nonsmokers, less. That's the closest thing to social acceptability of smoking that we have addressed -- providing cigarettes that smokers have asked for that irritates with its smoke less those around them. That is social acceptability, I

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suppose. Nor did we discuss that yesterday.

Q. And Dr. Lippiello's work with understanding nicotine and nicotine receptors had nothing to do with stopping the declining in the social acceptability of smoking?

A. Not to my knowledge. As I testified yesterday, when I first got here at Reynolds, I was in charge among other things of all animal research. He had some animals in his understanding the chemistry, especially the receptor chemistry of nicotine, and the physiology. When I asked him why he was doing that, his answer was just like Bob DiMarco's when I asked Bob DiMarco later. "We need to understand anything and everything there is about nicotine better than anyone else." That was, as I understood it, the role.

What other things he did with nicotine, I don't know. But what I do know he did was look at the physiology and chemistry in the rat model, both in cell culture and in some work in brain sections where he didn't expose the rat to smoke or nicotine, but he took brain sections from them and exposed those brain sections. That's all I know about his work when I got here.

Q. So it's your testimony that none of

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Lippiello's nicotine receptor work related to the commercial goal of reducing the decline in the social acceptability of smoking?

A. Not that I'm aware of.

Q. Let me show you --

A. I do know there were other people who looked at -- and whether Pat was involved -- who looked at the benefits of smoking.

Q. Let me show you what I'll mark as Exhibit 4.

(PLAINTIFFS' EXHIBIT 4 MARKED FOR IDENTIFICATION.)

Q. Do you know --

A. Do you want me to read it before I comment?

Q. Do you know who John Reynolds is?

A. Yeah.

Q. Who is he?

A. Do you want me to read this or do you want me --

Q. No. Who's John Reynolds?

A. First of all, John Reynolds is a person I mentioned yesterday that used to work for me.

Q. Okay.

A. Do you want me --

Q. You were his supervisor, weren't you?

A. For some period of time. I'd say from '92 to

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the end of '96, I was one of his bosses. I was not his boss in '83. And so far what I've been able to read -- allowed to read so far is exactly what I had said. Receptor chemistry. Activity chemical interactions on receptors.

Q. The document in front of you is Exhibit 4, correct?

A. Yeah, it says Exhibit 4.

Q. What's the date of the document?

A. 1983.

Q. Exact date?

A. Exact date is May 11th.

Q. What's the project entitled?

A. Fundamental research. Nicotine receptor pharmacology.

Q. And when you began at Reynolds, there was a group called fundamental research, correct?

A. Fundamental research? I believe there was a group that may not have been called that, but were functionally that.

Q. And Pat Lippiello was in that group, was he not?

A. Yeah.

Q. What's the description and background of the projects set forth in this memo?

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A. It says the goals on the technical level --

Q. No, up above. If you could read the description/background?

A. Oh, okay. "Current theories of the action of endogenous or exogenous agents on the central nervous system postulate" that are brought about -- "that observable psychophysiological effects are brought about by chemical interactions" -- in parentheses, "binding -- "of these agents with specific areas" in parentheses, "receptors" -- located in or on specific cell types within the CNS." Just as I stated.

"Therefore, to fully understand exactly how agents produce their effects, it is necessary to locate and characterize receptors, identify the cell types or brain areas" -- as I testified -- "with which they are associated, and determine what specific neurochemical processes or agents occur as a result of interactions of the receptors and active agents."

Q. Does that accurately describe the work that you were testifying yesterday and today that Pat Lippiello was involved in with respect to receptors?

A. Sounds like it to me.

Q. What is the only stated commercial goal of this work down below?

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A. It says to arrest the declining social acceptability of smoking, RJRT key issue number five.

Q. And what's in the handwriting?

A. New products resulting from enhancement of benefits.

Q. And what topic is Lippiello investigating?

A. What I read up above?

Q. Nicotonic receptors?

A. Nicotinic receptors. That work, as I had stated, was going on before I got here.

Q. Who's the manager of this work?

A. Well, the project leader is Lippiello and the author and manager is John Reynolds.

Q. Were you aware that Lippiello's work when it commenced had the stated commercial goal of arresting the declining social acceptability of smoking?

A. No, sure wasn't.

Q. Does that surprise you?

A. Yeah, it does, but it is what it is. I wasn't aware of it.

Q. You're not quarreling with the proposition, are you, that Lippiello's end goal and Reynolds' end goal in studying nicotinic receptors

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was to improve the sale of cigarettes?

A. Sounds like it was to improve the social acceptability of smoking. It doesn't say anything about sales here.

Q. You don't think that if you improve the social acceptability of smoking, it will increase sales?

A. No, I think it would increase -- or decrease the criticisms and unpleasant things smokers have to put up with --

Q. How about --

A. -- from society.

Q. How about if you develop new products resulting from enhancement of benefits?

A. That probably would help sales especially if the consumer understood those benefits that they were getting from that product.

Q. When you --

MR. MAISTROS: I'm sorry. Do you need to change?

THE COURT REPORTER: No.

Q. When you began at Reynolds, was there a group that was looking at understanding why people smoke from a sensory, physiological or psychological standpoint?

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A. I believe that was part of their objective. There was a guy named Dave Gilbert and Wally Pritchard and to some extent, John Robinson were looking at the reasons people smoke. They didn't work for me. I didn't interact with them very much, but that was my understanding.

Q. Was Reynolds involved in that work?

A. They worked for John Reynolds at that time.

Q. And wasn't one of the goals of that work to understand the effects that nicotine had on the smoking process?

A. I would not quarrel with those words. It was what role nicotine plays in smoking and the acceptability of smoking, in terms of the smoker himself or herself.

Q. How many people were working on that specific component of determining the role that nicotine plays in smoking?

A. Well, part of John Robinson's team -- one technician and John Robinson probably spent 20 percent of their time, something like that. Wally Pritchard probably spent more than half of his time on it with his assistants -- his assistant. Dave Gilbert probably spent at that time with his technician or technologist half or more of his time.

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So whatever that adds up to -- six people part-time. So it's probably two and a half people.

Q. How many --

A. I don't know.

Q. How many years?

A. I don't know. That -- I can only -- only tell you how that group's research from a distant view evolved from '84 on. They still work with some of the understanding of nicotine's role for smokers and why they like nicotine in their cigarettes. They also looked at smoking in general, behavior. How do people puff cigarettes and the electrical brain patterns I talked about yesterday that Wally Pritchard looks at. I don't know the correct term.

Q. And wasn't the purpose of that research to gauge and determine the proper dose of nicotine that had to be delivered to smokers?

A. No, not to my knowledge.

Q. Was the purpose to determine the levels of nicotine that was delivered to smokers, proper or not?

A. The purpose was to see what whole smoke did. There was some of the studies that were done where people were asked to do tests or you know, take difficult tests or do motor skill tests before and

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after smoking to see if what we had heard in the literature or saw in the literature was true, that it performed -- it improved mental tasks and cognizance.

Q. It wasn't to determine the doses of nicotine that smokers took?

A. No. I mean they might have taken blood levels to see what level their cigarette gave them. I don't know. It's possible. In the smoking behavior studies, they probably always took blood nicotine and blood carboxyhemoglobin and other measurements of smoking.

If you do a study like that and a person is not an inhaler, they won't have much, if any, nicotine in their blood. And they can't be studying smokers who don't have nicotine in their blood to see if they are like other smokers who do have nicotine in their blood. So whatever they were, they had to determine.

Q. And weren't they doing that research for the purpose of reducing the declining social acceptability of smoking?

A. It is my understanding that they did that work to understand the smoker, the role that nicotine and other things play in what smokers describe as benefits -- relaxation, alertness, that sort of thing. As part of that study, they needed to

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understand how that smoker smoked in terms of puffing and what levels of nicotine and cotinine and carboxyhemoglobin they had in their blood so they could determine if they were inhalers or not. Those are good markers of inhalation.

Q. So --

A. To my knowledge, none of the work was focused on what minimum amount of nicotine is required for smokers to derive things they see as benefits like I just described. If that was part of the work, I was totally unaware of it.

Q. I didn't mention the minimum amount necessary, but as long as you mentioned it --

A. Well, whatever, you know, amount -- minimum or maximum. If that was part of the work, I was unaware of it.

Q. And you were unaware if it was part of the work to reduce the decline in the social acceptability of smoking?

A. I was certainly unaware of that stated commercial goal there.

Q. Well, you were unaware of it insofar as the nicotine receptor work was ongoing.

A. (Indicating.)

Q. I'm talking now about the research to

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determine sensory, physiological or psychological responses of smokers to your products.

A. Was I unaware of what, commercial goal?

Q. Yes.

A. That's listed here? Yes, I don't know what their commercial goals were. We -- in the department that I ran and the scientists I worked with, we don't have commercial goals like this one had. We have the technical goals like is listed here, but commercial goals we didn't have -- in the toxicology group or the molecular toxicology group.

Q. You didn't have commercial goals in the toxicology group?

A. No. When we wrote our -- not that I'm aware of. When we wrote our objectives up, it was what are we trying to find out with this study? The use of animals, the use of cell cultures -- what are we trying to find out?

Q. In --

A. Seeing a document, of course, that precedes me -- it's an '83 -- with a commercial goal on it is unique for me.

Q. Have you seen the '92 to '96 strategic plan of Reynolds?

A. That's different than a scientific memo about a

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study. Certainly we want to be competitive and that is our commercial goals.

Q. Were you aware that in 1983 Reynolds management required the science departments and scientists to have a commercial goal for all of its research projects?

A. Apparently I wasn't because this is news to me.

MR. MAISTROS: Let me mark -- let me have those stickers. Oh, I have them. I'm sorry.

(PLAINTIFFS' EXHIBIT 5 MARKED FOR IDENTIFICATION.)

MR. MAISTROS: Exhibit 5 is a May 11th, 1983 memo from Reynolds to Reynolds and Reynolds. It's entitled, "Smoke Component Dose." Supports Program, "Fundamental Research, Biobehavioral Research."

MR. BELASIC: Just for the record, it's John Reynolds you're talking about, not Reynolds Tobacco.

MR. MAISTROS: Okay. Thank you.

Q. The -- could you please read the description and background of this program?

A. Sure. "To properly assess the sensory, physiological or psychological responses of smokers to products it is necessary to accurately determine the doses of smoke and tobacco components to

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individuals. Since the dose to an individual is dependent on his or her smoking behavior -- for example, puff volume, frequency, duration, etcetera -- measurement and understanding of the effects of these behaviors on smoke delivery must be accomplished."

Q. Does this accurately describe work that was ongoing within Reynolds' department when you came to Reynolds?

A. Yes, I mean that was my understanding of the description of the work.

Q. What is the technical goal of this work?

A. "To develop or improve means to accurately determine the doses of nicotine and other smoke components to smokers through the use of in-house expertise and outside consultants or firms."

Q. And what is the commercial goal of this project?

A. Arrest the declining social acceptability of smoking.

Q. Were you aware when you began at Reynolds that John Reynolds' work related to sensory, physiological and psychological responses of smokers was to arrest the declining social acceptability of smoking?

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A. No. As I stated before, it was my understanding they were trying to understand the benefits of smoking.

Q. In 1984 when you began, was Reynolds working on projects to better identify the level of nicotine that was processed by the human body?

A. Prior to 1984 was I aware that Reynolds was what?

Q. No. When you began in 1984 --

A. Oh, okay.

Q. -- did Reynolds have any research going on to determine and better assess the levels of nicotine that pass through the human body?

A. Well, this work right here obviously includes blood levels of nicotine seen in different smokers with different smoking behavior. And I was aware of that, that that was one of the parameters they looked at -- blood levels of nicotine, which I've already stated.

Q. Why did Reynolds want to understand the blood levels of nicotine?

A. Well, as I stated before, whatever things that they saw as to smoking behavior, they wanted to know what relationship it had to blood levels of nicotine and cotinine and blood levels of carboxyhemoglobin.

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I don't know if any of his studies included urine or not. It may have, but I don't know.

Q. And how long was Reynolds working on that when you started?

A. I don't know. At least a couple of years. And it's obvious here in '83 he was beginning to work on it or had been.

Q. And how long did that work continue?

A. Well, we still do smoking behavior work today. John Reynolds was not involved in it after 1992. So he left that area and joined my product development area in 1992. The -- Pat Lippiello was by that time working on this analog program we talked about. Wally Pritchard and John Robinson still worked on smoking behavior and benefits of smoking programs.

Q. And are the -- Reynolds still working on understanding the blood chemistry of nicotine?

A. Reynolds is not. He's retired.

Q. No. Reynolds Tobacco?

A. Oh, they still do work that includes the assessment of nicotine in blood. They still try -- although I think they've wrapped this up and Dr. Gary Bird's published it. They still look at the difference between different tar categories of smokers and their nicotine levels in urine and blood

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over 24 hours, and their cotinine levels.

Q. And hasn't the goal of that research since its beginning been to arrest the decline in social acceptability of smoking?

A. It's been to understand smokers, their behavior and what they want in products and the benefits of it. And also includes some of the allegations that have occasionally been made in the literature about ultra low tar smokers and light smokers and full flavor smokers being no different as to blood levels of nicotine or 24-hour nicotine low burden, that kind of thing. We've done work to evaluate that and shown that that's not true. So some of that work has been to evaluate that allegation.

Q. Hasn't it been the goal of that work to arrest the decline in the social acceptability of smoking?

A. I only know what the scientific goals were and I just stated them. I haven't seen commercial goals in scientific studies. Obviously I hadn't seen these. So the goal that Reynolds has as an R & D department and as a company is to be competitive and more commercially successful than our competitors. That to me is different than arrest the declining social acceptability of smoking. I would say that

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this program or any other hasn't been very successful because smokers catch a lot of criticism from nonsmokers around them. So if that was the intent, it didn't work very well.

Q. Would you agree with the proposition that nicotine has known physiological effects upon the smoker?

A. It has some known effects.

Q. How long has that been known?

A. Well, it depends on which physiological effect you're talking about. The vasoconstrictive properties of nicotine, the relaxation properties, the stimulate alertness properties have probably been known since the fifties and sixties to some degree.

Other things, later sixties through the eighties, they began to understand how nicotine's paradox evolves that I spoke to yesterday. That it can both relax and stimulate the same person. And in some people, it only relaxes and other people it only stimulates or makes them more alert. So more and more variability from person to person about nicotine began to be understood.

In the eighties, there were publications including some by Neil Benowitz in California and others that in some people nicotine over time lowers

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blood pressure, not raises it. So the physiological effects of nicotine has been, and I suspect will continue to be, an evolving fact-finding process.

Q. Wasn't Reynolds undertaking, when you began in 1984 and sometime before then and continuing to the present, studies to better assess and determine the effect and role that nicotine plays in the physiological impact on humans?

A. Reynolds in this time frame with the group I've already described have tried to understand the effects and benefits of smoking.

Q. Talking about nicotine?

A. Of smoking and what role nicotine may play in that. If we were trying to understand the physiological role of nicotine, I think we'd be given these nasal inhalers of nicotine and study nicotine patches and nicotine gum. We're interested in smoke and in nicotine's role in that smoke, not nicotine alone.

Q. Is it your testimony that Reynolds didn't commence any research with the stated technical goal of better understanding the role nicotine played in the physiological effects on humans?

A. I don't know. This group didn't work for me. And before '84, they didn't even work for the same

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guy I worked for, Wally Hayes. So I don't know what they were doing. Just don't know.

Q. Since 1994, you have no knowledge of Reynolds studying nicotine to determine the physiological effect it has on humans? Nicotine?

A. They may have. I'm just not aware of what they are and the details of it, if they are. It's very possible. I know the only study that I'm aware of where nicotine was looked by itself was one that we had done at Hershey, Pennsylvania where we were trying to compare the metabolic profile of nicotine in Premier, other cigarettes and I.V. nicotine at the same level to see if there was any difference. Because we knew the scientific community would ask us if Premier was unique in any way in the metabolic process of nicotine. We looked at that and showed its similarity and published that.

And that's the only thing I know of where -- I mean what I know -- where nicotine was ever given alone. And it was there to compare it against nicotine and smoke of tobacco burning cigarettes and tobacco heating cigarettes. And as I say, we published it. I don't know what else, if anything else, has been done with nicotine alone. I just don't know.

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(PLAINTIFFS' EXHIBIT 6 MARKED FOR IDENTIFICATION.)

Q. Let me show you Exhibit 6. It's dated May 11th, 1983. Author is J. H. Reynolds. The project is blood chemistry. Supports the program, fundamental research. The project leader is J. H. Robinson. Do you know Mr. Robinson, or did you?

A. Uh-huh.

Q. Who is he?

A. It's John Robinson.

Q. Is he a scientist?

A. Yes.

Q. And what was the description and background of the program project blood chemistry cited in this memo?

A. The description/background was, "The study of blood chemistry of smokers to -- is important for two reasons. Smoke components such as nicotine are known to have physiological and psychological effects upon the smoker. The exact amounts of these materials in the bloodstream of the smoker at any given time must be known in order to understand how these effects come about. Two, the physiological and psychological effects are mediated through other substances in the body such as hormones and neurotransmitters. Therefore, the circulating levels of these substances

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must also be known."

Q. What's the only stated commercial goal of this research?

A. Arrest the declining social acceptability of smoking.

Q. And what is the action plan?

A. In 1983, maintain and improve relevant subject pools as needed. Re-establish facility for obtaining blood samples. Develop methodology for determining nicotine, cotinine and other tobacco or smoke components in blood plasma, develop or improve method -- methods for determination of selected hormones and neurotransmitters in blood plasma. In 1984, extend and improve the bioanalytical capabilities, conduct extended or improved studies of blood chemistry."

Q. Do you know what RJR Key Issue No. 5 means?

A. I'd have to assume it means exactly what was stated here. Arrest the declining social acceptability of smoking.

Q. Do you know what key issues are?

A. Sure. Key issues are prominent objectives that people have in their programs.

Q. Have you ever seen key issues appearing in any memorandums from management since you've been

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employed at Reynolds?

A. Yeah. We had key issues when I came here.

Q. And who gives you those key issues?

A. Usually you develop them yourself and get approval of management. You try to use the company goals, the competitive goals, the performance goals as part of your key issues when it's appropriate. Sometimes it's merely understanding a product and not a commercial end point. Oftentimes it is, but I -- my key issues, I don't recall commercial goals in mine.

Obviously mission of different groups like a product development group is to improve our competitive stance with our competitors among smokers. That's a commercial goal, but I've never had as a missions statement and certainly not as a commercial objective decrease the decline in social acceptability of smoking in my groups. Could have been in other groups, and apparently was in '83.

Q. You haven't seen commercial goals as key issues since '83?

A. Other than mission statements like I described where you -- we've had mission statements for years like we want to understand the smoker better than anybody else and meet their needs better than anybody

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else. That's a commercial goal, so I guess you could say I've seen them in that form. We've had, and still have, phrases. We work for smokers and we want to be known to be the best tobacco company to meet consumer wants. We've had goals and objectives like that.

Q. Have you ever seen a key issue or a mission statement to the effect that it should be Reynolds' goal to improve the health consequences of its products?

A. Not -- I haven't seen words like that. I've seen and had in our goals to decrease the risk factors in cigarette smoke. Decrease the compounds of concern in cigarette smoke. Decrease the biological activity of cigarette smoke. Those have been goals.

Q. You've never --

A. Goals we're very proud of.

Q. You've never seen any mission statement or key issue that suggested that Reynolds should address health concerns related to smoking?

A. I've just described them. I just told you what I've seen.

Q. None that mention the world "health"?

A. I'm sure they have mentioned, you know, the

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alleged or perceived or possible health consequences. I'm sure it's been in different forms. Smokers want cigarettes that are less harmful to them, less hazardous to them. They all use different words. And various forms of their language or ours have probably appeared in goals and issues.

Q. Do smokers want cigarettes with nicotine?

A. They don't typically, if ever, tell you they want a cigarette with nicotine more or less. I've heard smokers when asked about that Next cigarette made by Philip Morris somewhere around 1990 that -- I've heard smokers say in consumer groups we have done where we've asked them what they want, they volunteer they don't want a cigarette without any nicotine. They like nicotine in their cigarettes.

So that's a -- I've heard that remarked by smokers. So I've heard them say they don't want a cigarette without any nicotine. So they expect at least some nicotine in their cigarette.

Q. Have you ever heard anyone at Reynolds state or suggest that smokers smoke because of nicotine?

A. I've heard smokers say nicotine is probably one of the reasons they smoke. I've heard people at Reynolds say that nicotine is important in the

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acceptance of smoking -- the taste, the mouth feel like I testified earlier. So yes, nicotine is an important component of cigarettes to most smokers like it is for cigar and like it is pipe.

Q. Isn't nicotine the most important component of tobacco?

A. I don't know what the most important component is. If you listen to the Duke scientists, they'll say it's probably not the most important, that there are other things equally important. If you listen to the Verbont scientists and publications they presented in Montreal, they say nicotine is not as important as some people think.

If you listen to the scientists at the University of Munich, they say nicotine may be important, but it's not the only important thing. There are other things equally important. So you hear everything from "nicotine is the most important" to "it's less important than other components" to "it's as important as any other component, so you get the whole range.

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Q. Well, in '84, how many scientists were in fundamental research when you joined?

A. I don't know how many were. You'd have to ask Bob DiMarco that question. You know, I don't know --

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I just don't know how many were in 1984.

Q. Well --

A. If so, how many were -- R & D probably had four or five hundred people in 1984. And how many of them were in, to use your words "fundamental research," I don't know.

Q. Did you interact with fundamental research in '84?

A. Yeah.

Q. Did you know Lippiello?

A. Yeah, and I've already testified to that effect.

Q. Did you know --

A. I met him when I came.

Q. Did you know Robinson?

A. Met him when I came.

Q. Did you know John Reynolds?

A. Met him when I came, yes. John was a peer. We both reported to Wally Hayes -- John Reynolds, not John Robinson.

Q. And would you agree that Lippiello, Robinson and John Reynolds were in fundamental research in '84?

A. To a large degree, yes. They probably had some other testing going on that wasn't fundamental, but

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certainly much of their research was fundamental.

Q. And do you know how many other scientists like Lippiello, Robinson and Reynolds were doing fundamental research in that group in '84?

A. Charlie Green had a group of people that studying environmental tobacco smoke as well as mainstream smoke chemistry, and they were in that group. I believe they were in that group. If they weren't, they joined it a short time later. They were doing some fundamental research.

Q. Do you know anyone else that was doing fundamental research in '84?

A. Well, there were certainly -- in the Premier group, which was known as Alpha at that time, they were doing basic aerosol research to understand aerosol from cigarettes that heat tobacco and its similarity and dissimilarity to smoke aerosol from cigarettes that burn tobacco, and that was fundamental. I had to get some new assays up and running and do some fundamental research on those assays. So a large part of my objective was fundamental research. Had to decide what assays we're going to use and there weren't -- there were many that weren't readily available so we had to set up some fundamental research to establish assays,

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improve them if they were in use in other places and make them more sound, so that was basic research.

I stated yesterday, certainly Bob DiMarco and Roy Morris and those people that had R & D back then, they had research that was fundamental going on at Duke, going on at UNC. Later at Bowman Gray and other places.

Q. Are you aware of the nicotine research committee?

A. Nicotine research committee? No, could have been in there, but wasn't aware of it.

Q. You're not aware that there was a separate committee set up to study nothing but nicotine?

A. No. I wasn't aware of it. Don't know if it was or wasn't there. That was their only goal, you're saying?

Q. That would be even objectionable by my standards to suggest that.

A. I thought that's what you said. Their only goal -- the committee's only goal was nicotine.

Q. Primary purpose. If I said, "only goal," I probably overstated it.

A. You did say, "the only goal." Be worth playing the tape back. I bet I'm right.

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MR. BELASIC: (Indicating.)

MR. MAISTROS: If you want to play that tape back, I'll do that. Could we take a break?

MR. BELASIC: Sure.

THE VIDEOGRAPHER: We're going off the record at 10:37 a.m..

(RECESS TAKEN FROM 10:37 A.M. TO 10:55 A.M.)

THE VIDEOGRAPHER: We're going back on the record at 10:55 a.m.

BY MR MAISTROS:

Q. I want to talk for a moment if we could about ammonia in the two aspects. One is its use in reconstituted tobacco and the other is its use in the de-nic process. It's my understanding that as far as you know, those were the only two uses of ammonia by Reynolds; is that correct?

A. I believe so to the best of my knowledge.

Q. Do you know what primary purpose and role ammonia plays in the de-nic process? How that facilitates the de-nic process?

A. I can only give you a rough understanding -- when I asked that question, when I first became aware of the de-nic process. And apparently in that de-nic tunnel, ammonia helps complex alkaloids, including nicotine. And it condensates on the tunnel and comes

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down into a liquid that's removed -- into the water wash that's removed. That's a pretty primitive understanding, but that's what I know about it. That's the impression that I got.

I, one time, went over and looked at the KDN facility. I was surprised to see it's just a big tunnel. Looks like a fire escape in old schools and hospitals, is what it looked like to me. And tobacco -- almost always burley, probably always burley -- would go down a belt in that tunnel. And it would be enclosed and be set in there a while and see moist heat and ammonia, as I understood it, was put in there to take out the nicotine so that it wouldn't recondense on the tobacco. But you know, that's a poor description of probably the technology.

Q. And it's your understanding that the only reason it's used in the reconstituted tobacco process is to facilitate the handling of the material, etcetera? Burn rate?

A. Diammonium phosphate, ammonium salt is used for burn rate control and for integrity of the reconstituted sheet, yes.

Q. And has ammonia to your knowledge ever been used as a flavor additive?

A. We've looked at it to see -- I've heard -- to

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see if it adds to taste. And the only thing I'm aware of is that to get any kind of chemical effect on nicotine or pH, it makes it taste worse. Makes it taste like a cigar. I don't know what work, if any, was done on all forms of ammonia for taste enhancement.

We certainly tried to understand from the literature the best we can what competitors do including the use of ammonia, but we're not convinced it helps very much, if at all. I mean we're open to the possibility, but we use diammonium phosphate for the reasons I described. And that level of ammonia salts, or gaseous ammonia for that matter, would not affect taste, I don't believe.

Q. What came first? Ammoniated reconstituted tobacco or natural reconstituted tobacco?

A. I would imagine natural did, but I don't know. I would imagine it's first.

Q. And it's your testimony that the ammoniated reconstituted tobacco was focused solely upon the issue of better handling, burning properties, etcetera as opposed to having anything to do with pH of the smoke?

A. That's -- if it had anything to do with pH

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smoke, I don't know anything about it. My understanding is as I've described and you've restated -- integrity and burn rate of the reconstituted sheet. What other things have been evaluated in tobacco or reconstituted tobacco sheet, I'm not very authoritative on that. I don't know.

Q. Were you DiMarco's boss when you began?

A. No. DiMarco has always been my boss until he retired. Or my boss's boss.

Q. Sorry.

A. He's been both my boss and my boss's boss.

Q. What did I say?

A. Was I DiMarco's boss?

Q. I'm sorry. DiMarco was your boss?

A. Yes, sir.

Q. For how long?

A. Well, he was my boss in the fact that he was my boss's boss from 1984 to 1990 -- June 20th, to be exact. Then he became my direct boss and he was my boss until he retired in '92. We had a retirement for him in July/August time frame of 1992. Then Carl Ehmann took over.

Q. Would he know better than you whether ammonia was used in the reconstituted tobacco process for the purpose of affecting pH?

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A. He might. I don't know what he knew and knows. I don't -- I don't have a good comparison what he -- you know, how much he knows versus how much I know. You'd have to ask him. We never discussed it, he and I -- that concept. I don't recall. We could have had a conversation about BAP for rod integrity and for sheet integrity in G-7 and for burn rate. I don't recall that we ever had that discussion. That was something that we never got into a discussion about to my knowledge.

(PLAINTIFFS' EXHIBIT 7 MARKED FOR IDENTIFICATION.)

MR. MAISTROS: Let me show you what we've marked as Exhibit 7 -- across the table, Mark.

MR. BELASIC: Thank you.

BY MR. MAISTROS:

Q. This is an exhibit that has a date in it -- addressed in it. "Based on our discussion on July 16th, 1982." I'm not suggesting that's the date of the memo. I can't read the date of the memo, but it's referencing a discussion on July 16th of 1982 and it's from a E. Bernasek. Do you know who that is?

A. Ed Bernasek. I met him before he retired. I didn't know him very well.

Q. What group or division or department was

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he in?

A. I don't really know. My assumption -- I can give you an assumption, which is I thought he was with a chemistry group, but I don't know.

Q. And how about -- is that Hystrom or Nystrom?

A. Nystrom -- Charles Nystrom. I mentioned him yesterday as one of the scientists that preceded us and stayed on a while and worked in Bob Suber's group after we arrived.

Q. Toxicology?

A. He's a chemist, as I understand it. Maybe a biochemist, but he helped with toxicology consultants like Dr. Leon Golberg mentioned here.

Q. Okay. And these two authors write to DiMarco, right?

A. Looks like they have, yeah. George Robert DiMarco.

Q. Write to DiMarco and state: "Attached are position papers describing our rationale for using the following additives in RJR tobacco flavor formulas."

A. Uh-huh.

Q. First one listed is ammonia. Do you see that?

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A. Yep.

Q. Did you ever -- were you ever aware that ammonia was referred to as an additive in RJR tobacco flavor formulations?

A. No, I was aware that it may have been looked at, but you know, what's its historical uses or possible uses were, I'm not -- as I've already stated, I'm not real familiar with it.

Q. Okay. In that --

A. They also have some sage derivatives that Avoca makes today used for the perfume industry, Sclareol and Sclareolide. We sell that to perfume makers in Europe.

Q. If you could turn to the next page, which is a memo on ammonia.

MR. BELASIC: Just for the record, it says draft memo at the top -- or "Draft 8-9-82" at the top.

Q. The first sentence says, "Ammonia is used by RJRT in the following tobacco processing operations: De-nicotinization of burley tobacco and ammoniation of reconstituted tobacco." That's consistent with your testimony, is it not?

A. Yes.

Q. And that was true, as far as you know,

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when you began in '84, correct?

A. As far as I know. I didn't get in -- in my early years here, I didn't get any details about ammonia or ammonia salts, but it's -- it was true as far as I could tell.

Q. Could you read the first paragraph below that?

A. "De-nicotinization of some of our burley tobacco gives us greater flexibility in types of tobacco we can use in our products to meet the constantly changing demands by consumers for cigarette products with different tar and nicotine levels. This process also permits us to also partially or completely compensate for the year to year variation in nicotine content of burley."

Q. Tobacco?

A. Burley tobacco. That's right.

Q. Do you agree with that statement or statements?

A. That was in concert with what I heard.

Q. On the couple of pages in --

A. Farther into the memo?

Q. Yeah, it's -- no big numbers, but there's a little number on the right that ends in 8509?

A. Okay.

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Q. Could you read the first full paragraph at the top below all those footnotes?

A. "RJRT is currently using zero to twelve percent de-nicked burley tobacco based on the total blends in all brands except the Now family. The Now brand contains 13 to 24 percent de-nic burley tobacco based on the total blend.

Q. Okay. Mine looks like 18 to 24, but yours could look like 13 to 24.

A. It could be 18. I can't tell.

Q. Were you aware that those percentages were being used in the -- all brands?

A. No. You know, I guessed ten percent or less earlier, but it was a guess.

Q. Okay. Under the -- there is a new heading called "Ammoniation of Reconstituted Tobacco," correct?

A. Yes.

Q. In the second paragraph, could you read that?

A. In the early 1970s, a major R.& D program was initiated to investigate the physical chemistry of tobacco and tobacco smoke in an attempt to gain a better understanding of the factors affecting smoke harshness, irritation and strength. These studies"

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-- something, I can't read that -- "to the following observations." I guess that's "led". Led to the following observations and conclusions."

Q. And what was the first conclusion?

A. "The pH of cigarette smoke is important to smoke quality. Can be used" -- something.

Q. Used to measure?

A. Used -- could be "to measure" -- I can't tell. "Used as a measure," it looks like. "As a measure of the physiological strength of smoke."

Q. Is that a proposition with which you agree?

A. It probably was looked at in that time and I certainly have testified if you move the pH of cigarette up, it becomes harsh and like cigar smoke, so that would be in concert with that.

Q. What was the second conclusion?

A. "Ammonia in smoke is one of the major pH controlling components. Others include nicotine, amines, organic acids and CO2, carbon dioxide.

Q. Do you agree with that proposition?

A. I imagine that you can use any of those or all of those to move pH around. So I could agree to that.

Q. Okay. Could you turn to the next page?

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What was the fourth conclusion or observation?

A. Is that a footnote or an observation?

Q. Well, it's a continuation of the observations --

A. Yeah, okay.

Q. -- and conclusions.

A. "Philip Morris introduced the use of added ammonia to their cigarette products in 1965. They used diammonium hydrogen phosphate in their reconstituted tobacco process to liberate ammonium pectinate prior to casting a reconstituted sheet.

Q. Were you aware of that?

A. No, I wasn't aware of when or what Philip Morris does, but I mentioned pectin yesterday and diammonium phosphate to strengthen the sheet's physical integrity. So you know, I was aware of the effect of diammonium phosphate in our products.

Q. What was the fifth observation or conclusion reached?

A. "Philip Morris brands, especially Marlboro, began growing in sales very rapidly after the introduction of added ammonia."

Q. Were you aware of that?

A. I didn't know when ammonia may have been used in their product and how that related to sales. So

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doesn't surprise me that that would be an observation, but I didn't know when or how that occurred.

Q. What was the sixth observation or conclusion reached?

A. Correlations -- excuse me. "Correlation studies relating increased smoke pH to sale trends showed a very strong positive correlation." RDM, 1973, No. 17.

Q. Were you aware of that?

A. I was aware that there was speculation and documents that looked at a product called Kent and tried to describe their increased sales due to pH. I was made aware of that by a Dr. Mike Doobie who brought it forward to me to talk about how ridiculous it was because the sales of Kent went up after the Reader's Digest article according to him and the numbers he showed me on its micronite filter, not on pH. So that was the only reason I was aware of.

Q. So you don't know if Reynolds ever took any action or engaged in any research to try to duplicate Philip Morris's success or alleged success in increasing sales by increasing pH?

MR. BELASIC: Object to the form. That misstates the document.

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MR. MAISTROS: Well, I'm not referring to the document. I'm referring to his statement.

MR. BELASIC: Well, it misstates fact and assumes facts not in evidence.

MR. MAISTROS: Okay.

MR. BELASIC: You can answer.

A. I mentioned yesterday a vague awareness because I don't know the details of some work done in the early eighties with ammonia and chemical hoods on tobacco to see what ammonia did to nicotine and pH. And the conclusions, as I understand, of that study was if you put too much ammonia in products, it makes it taste bad, harsh, repugnant and more like a cigar. I was aware because of that conversation I had with Mike Doobie that there was an interest in the relationship that ammonia might have to sales, but it certainly didn't describe Kent's increased sales.

And we, as I stated yesterday, looked at the documents on the internet to see what the allegations or hypotheses on ammonia in Philip Morris and B & W products as to taste. We still try to understand our competitors and what ingredients they use, including ammonia and what it may do for their taste signature. We work on that. We try to understand what our competitors know. So ammonia and its relationship to

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taste and Philip Morris products is of interest to us, but we don't understand what role it plays.

Q. Didn't Reynolds Tobacco originally use ammoniated reconstituted tobacco for the sole purpose of increasing the pH in the smoke?

A. If they did, I don't know that. I'm not aware of that. You'd have to ask some of the folks that were with this company far prior to '84, I suspect. Because that goes back to the history of reconstituted sheets and all the varieties of it that they looked at, so I don't know.

Q. What's the next paragraph say?

A. The one without a number?

Q. Right.

A. "Based on the above observation, it was decided to investigate the use of ammoniated reconstituted tobacco as a means of increasing the smoke pH of RJRT's cigarette products."

Q. Go on.

A. "NFO tests indicate that smokers prefer products containing" -- I can't read it. G-7A? Is that what that says?

Q. Says that on mine.

A. I can't read the next two or three words. "Products containing only G-7 untreated reconstituted

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sheet tobacco." So apparently they looked at treated and untreated, but I don't know what the treatment was. I can't read it. "Since the introduction of" --

Q. Wait, let's go back.

A. Okay.

Q. Doesn't it say, "NFO tests indicate that smokers prefer products containing G-7A over products containing only G-7"?

A. It could say that. It looks it might. I can't --

Q. Paren, "untreated reconstituted tobacco," paren?

A. It definitely says that in parentheses.

Q. What's the last sentence say?

A. Since the introduction of -- since the introduction of -- something Camel filter.

Q. What about "in"?

A. "In Camel filter in 1975, G-7A has been tested and/or introduced into 19 additional brands."

Q. Were you aware of that?

A. No.

Q. Does that surprise you?

A. Yeah, I mean I just didn't know, so I'd have to say it probably was.

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Q. Does it change your opinion on whether or not ammonia had the sole purpose of affecting the handling properties of the G-7 or reconstituted tobacco?

A. Well, certainly that's how we use it today and why they used it, started ammoniating G-7 if that's the implication of this. They have included what they thought was a taste improvement from what is said here.

As I stated yesterday, we've looked at various times with and without DAP. And we have found that we've been unable to attribute much to DAP and G-7 for taste.

Q. What's the next paragraph say?

A. "Analytical data show that current Camel filter which contains both de-nicotinized tobacco," I guess? "Sev n point six percent based on total blend and G-7A, 27.54 percent based on total blend, delivers approximately" -- is that 36 micrograms?

Q. Looks like 36 to me, but I couldn't tell you if it says micrograms.

A. I don't know what that -- which -- if that's -- I believe that's "micrograms of ammonia per cigarette in the mainstream smoke. A two-pack-a-day Camel filter smoker will be exposed to approximately 1440

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micrograms of ammonia per day."

Q. Were you aware that Camel filter, at least in 1982, contained 7.6 percent de-nicotinized tobacco and 27.64 percent of reconstituted sheet that contained ammonia?

A. No.

Q. Do those percentages surprise you at all?

A. I'm not surprised by them. I was just unaware of them. It reminds me of a project that the product development group had looking at a G-7 ammoniated sheet trying to duplicate what competitors had that didn't have very much success in taste improvements. That project was underway when I switched over to advanced technology products and I was just aware of it.

This reminds me of that project, to see if they can make our products taste better using that kind of sheet, but it wasn't very successful. That's why -- part of the reason I said that the relevance of ammonia to taste is still debatable because we haven't had a lot of success making our products more acceptable to our smokers with it.

Q. Would you agree with me, though, that at least based on this memorandum, it would appear that Reynolds was attempting to affect the pH level of its

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cigarettes by the use of ammonia?

MR. BELASIC: Object. It misstates what the document says.

A. It appears that one of many objectives -- six or seven -- that there was one in there trying to understand what relationship ammoniated reconstituted sheet might have to the pH of smoke. How much importance that was on their objectives, you'll have to ask Dr. Bernasek and Dr. Nystrom.

Q. Well, after it lists the seven observations of the effect of ammonia, what is the first sentence following those seven observations?

A. "Based on the above observations, it was decided to investigate the use of ammoniated reconstituted sheet as a means of increasing the smoke pH of RJRT's cigarette products. And investigated, I guess they did.

Q. And since the introduction of Camel filter in 1975, G-7A has been tested and/or introduced in 19 additional brands; is that accurate?

A. I guess it is. "Tested and/or introduced." I don't know if it stayed -- introduction could mean it was tried in test market and it may have stayed if it was successful, or it may not have stayed. We've had an ammoniated G-7 that was tried, as I described

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earlier, to improve the taste of our product. That particular project didn't -- when I was told about it, include smoke pH at all. It was about trying to improve the taste.

If ammonia raises pH in the reconstituted sheet or anything else, it's going to make it more harsh, not less harsh. That we now know. They may not have known that then. They may have assumed it made it less harsh, but we know it makes it more harsh.

THE VIDEOGRAPHER: Mr. Maistros, we have five minutes left on the videotape.

Q. What individual currently employed at Reynolds would have the most knowledge concerning the purpose and intent of using ammonia in tobacco processing?

A. Probably Watt Dufour and Tom Perfetti, I would guess. They would be two people that would probably be more aware of it than I.

MR. MAISTROS: Let's change the tapes, if we can.

THE VIDEOGRAPHER: We're going off the record at 11:19 a.m.

(RECESS TAKEN FROM 11:19 A.M. TO 11:23 A.M.)

THE VIDEOGRAPHER: This is tape five of the videotaped deposition of Gary Burger, Ph.D..

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We're going back on the record at 11:23 a.m..

BY MR. MAISTROS:

Q. What happened in 1992 with respect to you and whatever positions you held?

A. I had -- as you know, I had the advanced technology products earlier in the year. And then when Bob DiMarco retired, Carl Ehmann was hired to replace him -- Dr. Carl Ehmann. He came to us from J&J. He reorganized the R & D department.

And as a result of that reorganization, I kept advanced technology products. I picked up other product development activity from the materials group. I picked up brands. And later, under my advice, he moved brands as a direct report to him. I picked up at that time inhalation and animal toxicology.

Q. Are we saying '92?

A. The later part where those changes were made were probably late '93, early '94.

Q. Did you still have that title? Vice president, advanced technical products?

A. I had then the title of vice president, product development and assessment.

Q. That's from '92 until --

A. Until May of '96.

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Q. And as vice president of product development and assessment, what groups or divisions were under that?

A. That included new cigarette technology, something referred to as advanced technology products development. I don't remember the exact words. In '92, it included brands. And it included the Eclipse group.

Q. And this inhalation?

A. Later came to me -- inhalation animal toxicology -- late '93 or early '94. And brands went over as a direct report to Dr. Ehmann.

Q. And what was the primary duties you had with respect to brands?

A. Well, in that interim, that '92/'93 time frame, the group in R & D that has brand maintenance, brand specs and liaison with marketing is just called brands R & D. So I had a guy named Joe Inman working for me that headed that group. He was one of my direct reports and that group was my responsibility.

Q. When you say "brand specs," what's that?

A. Well, any time we have a new brand style or a change in the formulation of a brand style, the brand's organization determine what the new specs or design or ingredients or components will be. And

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they shepherd those specs to make sure that they're abided by with the help of quality assurance and manufacturing. So they are in charge of what are the specifications and how are they being attended to by manufacturing.

Q. Is the -- you were in that position for '93 to '96 over brands? No, it was removed. How long a total period were you in brands?

A. I'd say from June 20th of -- let me think a minute. Sometime that summer. Late June, early July, maybe a little later. Carl reorganized and gave me brands and the materials product development people. So I had brands from mid '92 to late '93 or early '94, somewhere in that time frame.

Q. Were there groups under brands?

A. They had product specs group. They had different brand -- Winston, Camel, Vantage, Salem. You know, Vantage I think, and More were together. And then we had another group called Savings Segment brands.

And that gets moved around from time to time depending on what marketing is doing with their projects. Sometimes Vantage, More and Now are with savings segment, sometimes they aren't. It varies onto what the strategic plan of the company is.

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Q. Was there an individual in charge of each -- like product specs, Vantage, Savings?
A. Yeah, usually the direct reports of the head of brands have spec responsibility for each brand. In some cases -- in the case of Vantage, More and Now -- one individual will have more than one brand.
Q. Is product specs the group that was responsible for formulating the various brand specifications?
A. Yes, with the help of other parts of R & D product developers, they are the group that's responsible for it. They get help from other groups if there's any changes made.
Q. How does R and D interact with brands to develop product specs?
A. Brands R & D or brands downtown.
Q. There is brands R & D?
A. Yeah.
Q. What was that under?
A. That was the group I'm talking about out in R & D. They are a liaison with the marketing people downtown, the business brands people. And how R & D interacts with the group downtown is through that brands R & D group. They are the liaison group.
Q. There's brands R & D and there's

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Lippiello's R & D?

A. Oh, yeah, there's lots of R & D functional units. Lippiello was in biobehavior or biochemical under Wally Hayes when I came and has stayed with that general group, but now works for Dr. Don deBethizy.

Q. And what group originates the chemical mix formula recipe for a particular brand?

A. Brands R & D in conjunction with product development, which is now under Dave Townsend and brands R & D is under Skip Tensley now. Product development, Dave Townsend. Brands R & D, Skip Tensley.

Q. Were you familiar with the brands specifications during the time period you oversaw brands?

A. Not intimately, no.

Q. Do you know what went into making up the brand specifications?

A. No, it was always available if I wanted to know. Occasionally I would ask what -- you know, what blends have as to amounts of different kinds of tobacco.

Q. Okay. I'm not asking you to memorize specific blends. I'm asking you, do you know what

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different components went into the specifications?
A. I don't remember for any particular brand, but I had it available when I wanted to know.
Q. Without getting into specifics -- I'm not looking at percentages of blends or types of filters, but looking at -- if I wanted to look at a specification for a particular cigarette, how many different, like, headings would there be of different things that went into that?
A. There would be the type of tobacco, how much reconstituted sheet, how much expanded tobacco.
Q. When you say type of tobacco --
A. Burley, flue-cured, Turkish.
Q. Okay. That's a number one, separate and apart, stand-alone component? Type of tobacco?
A. Type of tobacco is part of the specs.
Q. What other --
A. They usually are in descending order of amounts.
Q. Okay.
A. So the largest -- most -- many brands, that would be flue-cured tobacco. It would put how much percentage of flue-cured tobacco is in the blend.
Q. And what's the second component?
A. The second component is most often burley.

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Q. What's --
A. In the case of the product in Oklahoma City, there is no burley so it's not the second component.
Q. I understand there is burley, flue-cured and Turkish, or a combination --
A. Right. Okay. The next category you're talking about?
Q. Yes, next category.
A. It's typically how much, if any, expanded tobacco and reconstituted sheet is in a given brand. To the best of my knowledge, that's how it's listed.
Q. Would those be two separate items? Expanded and reconstituted?
A. Yeah, they would be listed as different. They would be listed by some G-7 number.
Q. What else?
A. Or in the case of the expanded tobacco, G-13, G-19. These days it would be G-19 most frequently.
Q. What else? Are there other categories?
A. They may give a -- under brand specs, a top-dressing and/or a casing spec, what kind of casing. For example, as I told you when I first took over, Winston Select development -- that brand, Winston Select, was looking at one of these G-7 sheets that this reminded me of, this memo. And I

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had a product developer that said he could make a much better Winston Select using different casing on burley than G-7 could ever do, and we switched to that. It became the Winston Select blend.

So then on the specs, that casing for burley and casing for whole blend, if there is one, would be listed. Top-dressing would probably be next. What flavors, if any, would be put on it.

Q. What is the layman or myself -- what is the casing to me?

A. Well, you know, like a sausage has a casing? A tobacco blend would have a casing sprayed on it before it goes into the dryers. And it heat-fixes the casing so it keeps the moisture of the tobacco in place and adds to a sweet note if you want it to be sweet or a strong taste if you don't want it to be sweet.

Q. It's not the paper wrap?

A. No, it's like a film of sugar and other materials. Sometimes cocoa, sometimes glycerol. And so it's a mixture, a liquid mixture that helps seal the surface of the tobacco.

Q. And that's the tobacco in its rough form as opposed to each individual cigarette?

A. Yes, yes.

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Q. In other words, there is not a casing around each cigarette?

A. No. We're interested in seeing if what's called total blend casing would make better tasting cigarettes. We haven't done much work on that. In fact, none. We're just thinking about it. Maybe if it helps burley, it will help the whole blend.

Q. Well, where are the flavorants added? To the top-dressing? The casing or --

A. Usually when the tobacco blend -- there are a variety of ways, but the most common one that I understand is when after the burley and the flue-cured and Turkish are mixed together or any reconstituted sheet or puff sheet of tobacco, it's all mixed together. And the most frequent way is spray it on it, a nozzle spray for flavors, top-dressings.

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Q. That's -- are flavorants limited to top-dressings?

A. You can occasionally -- you can put them in the casing if you want to. If you want to affect an individual component of the blend like burley and you want to make it sweeter, you can insert a sweetener like sucrose or fructose in the casing if that's your goal. And this gentleman I'm referring to, his name

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is Gary Sheeler. He's a product developer. He believed what you could do with the casing of burley would give you a smoother and/or better tasting cigarette than any G-7 sheet could, and he proved it. And we put that in our specs.

Q. What other categories are there after casing?

A. The top-dressing, which is where flavors can be put in and some more humectant if you like -- more glycerol, for example. That's often top-dressed, the humectant is. What other ways you put humectant in, I'm really not familiar with it, but definitely you can put it in the top-dressing.

Q. And what other categories are there in the specs?

A. I think that about covers it in terms of tobacco component.

Q. I'm looking at the whole cigarette.

A. The whole cigarette, they'll list the type of pipe from a vendor like Eastman -- I mean like Ecusta or in the old days, Kimberly-Clarke. We don't do much business with them anymore. But there's Mauduit in Europe that we buy cigarette papers from. There are three or four cigarette paper suppliers. We have specs for filters that we get from either

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Herselameese or from Eastman. Once in a while we'll get filters from Mariton Filtrona. So it will list which company by code and which type and which spec of filter or which spec of paper.

Q. Is there anything else?

A. They may give -- well, there are qualifiers under each category, however much -- or what percentage of flue-cured and what percentage of burley. They'll give a quantitative figure on some of the components. In terms to casing or top-dressing, they usually give a percentage by weight of the tobacco. Like if you want a casing two percent, it'll be approximately two percent of the weight of the burley that you're casing it in.

Q. Are there different types of overwraps that are specified? Do you know what I mean by overwraps?

A. Well, if you're talking about plug wrap, the overwrap of a cellulose acetate tow, yes. There are not very many varieties of that, but there are a few. In the case of the cigarettes that we've successfully introduced to lower environmental tobacco smoke like Pianissimo in Japan, you've got a spec of what the papers are. There are two papers and there's a spec for each paper around the tobacco rod.

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Q. How does Pianissimo reduce ETS?
A. Through the paper. It makes it less apt of the sidestream smoke to go in the room.
Q. Are you using that here?
A. We're evaluating it, but right now we're not using it. We tried a similar product called Vantage Excel, and it bombed in test market -- probably '91, 1991, somewhere in there.
Q. Why are you marketing Pianissimo? Is that right? Pianissimo?
A. Pianissimo.
Q. Pianissimo in Japan as opposed to here?
A. In our consumer test, the Japanese smoker is very interested in it. As I understand it, Pianissimo means polite. And they consider it a polite cigarette. It doesn't irritate their family or friends. They are very interested in it.
Q. Don't your consumer tests show that the U.S. smokers also are interested in that?
A. Yes, but the difference was that at the time we tried it here in a program called Vantage Excel, we didn't have the technical breakthrough on the paper that we now have with Pianissimo. And as I said, we're evaluating a product similar to Pianissimo for this country. We're trying to develop one that

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marketing would like to have.

Q. Is that product that you're marketing in Japan, how long has it been marketed?

A. Almost two years.

Q. Was that introduced to address perceived health risks related to smoking, or real health risks related to smoking?

A. It was reduced to -- it was produced to address irritation to nonsmokers by smokers. Decreased secondhand smoke. Wasn't anything to do with health.

Q. It's not the intended purpose of Reynolds to use that product in Japan to address any health concerns?

A. No, other than the brand styles are ultra low tar. I think they are around five or six milligrams and one milligram.

Q. But the primary advantage of this product in Japan is to reduce secondhand smoke?

A. That's correct.

Q. And the primary purpose of doing that is to reduce irritating nonsmokers?

A. Irritating and annoying nonsmokers, that's right. That's why they tell us they are interested in it, the smokers that buy Pianissimo.

Q. As opposed to addressing those

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nonsmokers' health concerns?

A. That's correct. I don't know -- I don't know -- in the Japanese smoker, I hear that they don't believe secondhand smoke hurts those people around them. So I doubt if there is very little -- very much interest from that point of view of the Japanese smoker. It certainly wasn't the interest or focus of interest by the marketing group over there.

Q. Where did you hear that Japanese smokers don't believe secondhand smoke affects those around them?

A. Well, I heard that from our marketing people, that they put less credit in that than American smokers might. But when I was over there making a presentation on product modification in '90 -- 1993, I believe it was, that's what their scientists told me. And their scientists -- I didn't meet with any tobacco scientists. This is their health community. I just -- in my presentation, I talked about low sidestream cigarettes. And they just made the observation that there probably wasn't much interest for health reasons by Japanese smokers in that product. And they just volunteered it in response to my presentation.

Q. But they are interested in not irritating

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their nonsmokers that are around them?

A. The smokers are, yes. And that's what they tell me and the name means that. It's a polite cigarette. They even like the name for that reason.

Q. And then has Reynolds attempted to market that cigarette or a comparable cigarette over here?

A. We've looked at it in Salem and we're back trying to figure out if we can make it more taste acceptable to American smokers. There are different taste preferences in different countries. I've been told that and that seems to be true.

Q. You've looked at it in Salem, the town we're in?

A. Pardon me?

Q. You've looked at it in Salem the cigarette or Salem a city?

A. In Salem the cigarette. In a limited test market -- consumer test somewhere in the upper Midwest we looked at it. It was a program called Salem Preferred. It had decreased sidestream smoke and it had a vanilla flavor in the paper which makes the smoke smell better.

Q. Has Reynolds developed any other products to address perceived or real health risks related to secondhand smoke?

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A. If you're concerned about -- we developed Premier and Eclipse. And as a smoker, if you're concerned about secondhand smoke and the allegations against it, then that would be part of the interest that you would have for Premier and Eclipse.

Q. Any other product?

A. Well, the Vantage Excel would have had -- you know, I think it was '89 that the surgeon general and others started expressing significant concern about secondhand smoke. So some of the interest by consumers in Vantage Excel, the project I mentioned before, was in that vein of concern, that vein of allegations. And so they -- some of them were interested conceptually in Vantage Excel because it might "hurt," quote-unquote, those around them less.

Q. Are you aware of any ongoing studies at Reynolds to look at secondhand smoke and alleged health risks related thereto?

A. We have had in the past -- when critics of secondhand smoke have made allegations about exposures and the amount of exposures, we have looked at blood and urine markers of secondhand smoke exposure, the markers they use and claim are good and see how good they are. We have suggested better markers than what they have suggested and published

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that.

If you want to know exactly how much environmental tobacco smoke somebody is exposed to, we've published on what would be better markers than some touted by others. So we have done research in the area of dosimetry or markers of exposure with the secondhand smoke.

We've done no research in terms of smokers on any biological effects other than what I just described. We have looked at the worst case and exaggerated worst case of -- of environmental tobacco smoke in animals and have published that in rodents and rats particularly, and somewhat mice.

And we have done one study in conjunction with Bowman Gray on markers or change in people exposed to environmental tobacco smoke. They did the study and we provided the funds for it. And Dr. Doolittle interacted with them to give them input from what he had learned in animals. That's the only thing I know of that resembles the category you asked.

Q. When you do inhalation studies on animals -- when I say "you," Reynolds --

A. Uh-huh.

Q. -- does inhalation studies on animals, aren't those in effect secondhand smoke studies as

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well? Because you don't actually get those animals to inhale those cigarettes, do you?

A. Those are mainstream inhalation studies of mainstream smoke. They are not studies of the sidestream smoke. And we have probably the best system in the world of getting the smoke quickly and in known doses to the mouths and noses of the animals. So they are mainstream smoke, not sidestream smoke or environmental tobacco smoke studies.

Q. Did you do --

A. We have argued when other people whole-body expose animals -- put them in a room and just shoot a bunch of smoke in there -- that might be closer -- we had made that argument, closer to sidestream smoke than mainstream smoke. That's why we use nose only and we use a smoke exposure system that's as short as it can be from the filter of the cigarettes to the nose of the animal.

Q. When you were doing your Premier research, didn't they intentionally or otherwise look at the biological activity of secondhand or sidestream smoke insofar as Premier was concerned?

A. We did some toxicological work on environmental tobacco smoke from chambers that Premier had been

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smoked in. We also looked with Premier sidestream smoke at allergy tests in mice and we published that.

Q. And didn't it show less biological activity?

A. Yes, it showed less allergy irritation. It showed less mutagenicity in cell cultures from the chambers in which those Premier smokers smoked Premier versus other cigarettes.

Q. And didn't the reference cigarette that you used in those comparative tests show more biological activity as a result of sidestream or secondhand smoke?

A. Showed more biological activity, yes. You had to really -- to get any biological activity in the genetic toxicology assays, you got to really concentrate the air from those chambers big time to get anything. Very exaggerated doses. And what you get is pretty mild.

Q. Well, aren't most toxicology tests on substances exaggerated doses?

A. Not as exaggerated as these were.

Q. But aren't exaggerated doses a pretty good reference tool that toxicologists have used for decades?

A. It's a tool. It's beginning to be argued more

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and more how good they are. I was -- when I was on contract to the FDA and EPA, one of my major objectives were to try to figure ways other than maximum tolerated dose to use as dose setting. That is the program that was used at that time by the National Tox program. They are changing because they know it is not scientifically sound because you end up studying a substance or a complex mixture as a toxicity of a particular organ as opposed to real carcinogenicity of it.

Q. Have you ever read Wallace Hayes' textbook called Toxicology Principles?

A. Yes, on two editions of it, I was a chapter author. I've read parts of it, yes.

Q. Did you know the other authors and contributors to that text?

A. Some of them. Some of them.

Q. Do you respect their work?

A. To a large degree. It depends on which one. I respect all the authors, but I have varying degrees of respect or professional judgment as to quality.

Q. Did you --

A. But they are all pretty good.

Q. Did you respect the work of Wallace Hayes?

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A. Pretty well.

Q. Wasn't he the editor of that publication?

A. Yes, he was.

Q. Have you been asked to offer any opinions in the secondhand smoke or environmental tobacco smoke trial that's going on now in Florida?

A. No, I have not. I'm not the expert on environmental tobacco smoke issues in Florida or any other place.

Q. Have you been consulted in that litigation in any fashion?

A. No, the only discussion I've had about it is I've asked who would be our expert witnesses. I asked our in-house attorney, Mike Johnson.

Q. Who are --

A. And then I've read the paper each day on the growing case to see how it's going.

Q. Who are Reynolds' in-house experts on environmental tobacco smoke?

A. Mike Ogden, Charlie Green. Statistically speaking, Tom Stiken. Toxicologically speaking, Dave Doolittle.

Q. I've got to meet Dr. Doolittle.

A. Dr. Doolittle and the animals.

Q. Let me show you what I'll mark as Exhibit

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8.

(PLAINTIFFS' EXHIBIT 8 MARKED FOR IDENTIFICATION.)

Q. Let me see that. Can I see that back? I'm sorry.

A. Sure.

Q. It's a document the title of which is what?

A. "Statement of R. J. Reynolds Tobacco Company before the U.S. House of Representatives Committee on Energy and Commerce Subcommittee on Health and the Environment Concerning Whether the Food and Drug Administration Has Jurisdiction To Regulate and Therefore Ban Cigarettes."

Q. Have you seen that document before?

A. I believe I have. Looks familiar.

Q. And did you participate in the preparation of any draft to that document or that actual final document?

A. Not directly. I don't know in that exercise I described yesterday if this -- if this is the Waxman hearings, then part of my feelings and beliefs may have been part of what was said. Is this the Waxman hearings?

Q. What's the date of that document?

A. April 14th, 1994.

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Q. I'd ask you to take a look at it and tell me if you believe you contributed to any portions of that document?

A. Okay. I'll have to flip through this real quickly.

Q. Take your time.

(WITNESS REVIEWS DOCUMENT.)

(MR. MAISTROS AND MS. KNISELY CONFER OFF THE RECORD.)

MR. MAISTROS: Mark, could I see your copy of that? Not that --

MR. BELASIC: Oh, sure.

(DEPOSITION INTERRUPTED AT 12:03 P.M.)

MR. BELASIC: Let me know when it gets started.

THE WITNESS: Uh-huh.

(MR. BELASIC EXITS CONFERENCE ROOM AT 12:03 P.M.)

(WITNESS REVIEWS DOCUMENT.)

(MR. BELASIC ENTERS CONFERENCE ROOM AT 12:05 P.M.)

(WITNESS REVIEWS DOCUMENT.)

THE WITNESS: Okay.

BY MR. MAISTROS:

Q. Did you contribute in any aspect to that statement?

A. The nine patents that were discussed, the general points that I gave Chuck Blixt may have been

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used for that part. I don't know, but it could have been.

Q. That's the only portion?

A. Yeah, other things I have said that might have added to this are simply parroting what Drs. Robinson, Pritchard and others have published and said. So mine would be just "I agree," would be my contribution to that part.

Q. I assume that you would agree with the statements throughout this document that Reynolds does not manipulate nicotine to addict smokers?

A. Yes, I agree with that.

Q. You agree with that. Would you agree with the proposition -- yes or no -- that Reynolds does control the level of nicotine in its tobacco products?

A. Indirectly by controlling tar, as I have stated.

Q. And that's the only method?

A. The only one I'm aware of. And you know, I've discussed how we've handled the design of Eclipse and Premier for the aerosol delivery and that will have, just like it does for other cigarettes, some tracking by nicotine.

Q. You do not believe that the type of

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filters used affects the nicotine yield of Reynolds cigarettes?

A. It would indirectly by controlling the amount of tar particles that enter the mouth of the smoker.

Q. You do not believe that the type of paper used on cigarettes affects nicotine yields?

A. Only -- and once again, indirectly as how it delivers or affects the delivery of tar particles, because nicotine is primarily on tar particles.

Q. Do you believe that the amounts and types of reconstituted tobacco used by Reynolds affect nicotine yields?

A. Very little, if any.

Q. Do you agree that the amount -- amount and use of expanded tobacco affects nicotine yields?

A. It would do so only indirectly in the way that it affects tar delivery.

Q. Do you believe that the type of tobacco used -- burley versus flue-cured versus Turkey -- affects nicotine yields?

A. Certainly it can affect nicotine yields based on how much nicotine is in each leaf, as well as affect tar delivery.

Q. Do you believe that the top-dressings affect nicotine yields?

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A. I don't know how they would.

Q. Do you believe that the casings affect nicotine yields?

A. Only -- and I don't know that they do. If they do, it would only be what they ever do -- what they do to tar, it would have an indirect effect on nicotine.

Q. Would you agree with the proposition that nicotine is perhaps the most important compound in a tobacco?

A. It's one of the most important.

Q. What's more important?

A. The -- in my opinion, whatever the organoleptics are for taste are equally important. We are trying to find out what they are.

Q. Is there any chemical compound in tobacco that is more important to a smoker's decision to continue smoking than nicotine is?

A. I don't know. I wouldn't think so, but I don't know.

Q. And it's your testimony that Reynolds does nothing to control the levels of nicotine in its cigarette products --

MR. BELASIC: Objection.

Q. -- other than through the regulation of

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tar?

A. It controls indirectly, through the regulation of tar, yields of nicotine. And that's an indirect because whatever you do to tar, does to nicotine. But we don't do anything for nicotine for the alleged addictive levels.

Q. And I --

A. We think nicotine, among other things, are important for taste.

Q. I didn't mention addictive levels.

A. Okay.

Q. Addictive levels are not in my question. I know that every time manipulation of nicotine is used in Exhibit 8, there is the phrase added "to addict people." I'm talking about, is it your testimony that Reynolds does nothing to control the nicotine levels in its tobacco products other than controlling the tar?

A. Nothing that I'm aware of other than it will indirectly affect nicotine as stated in Exhibit 8.

Q. Well, where in Exhibit A --

A. Eight.

Q. -- eight, is that stated? Is there a phrase anywhere in Exhibit 8 that talks about Reynolds not manipulating nicotine that doesn't also

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contain the phrase "to addict smokers"?

A. There is a statement in here that talks about nicotine following somewhat the control of tar.

Q. Can you find --

A. I'll look if you like.

Q. Okay. I'd ask you as you look at that, I'll ask you if you can find any statement or phrase or sentence in there that would suggest that Reynolds does not manipulate nicotine, but also does not have the phrase, quote, "to addict smokers," unquote, followed by that.

(WITNESS REVIEWS DOCUMENT.)

A. Doesn't use the word "manipulate" and use the words "development of new technology to reduce yields of tar and nicotine generally."

(WITNESS REVIEWS DOCUMENT.)

A. There's statements like I've already stated about the amount of tobacco in cigarettes has been reduced with the corresponding result that smoke nicotine has also been reduced.

Q. I just want you to go through -- and you can tell me if I'm wrong, but is there anywhere in here where Reynolds uses the word "manipulate," but does not qualify it with the phrase, "to addict smokers"?

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A. I haven't found one so far. I don't know that they use the word "manipulate" without "addiction." I don't know. I haven't seen it so far.

(WITNESS REVIEWS DOCUMENT.)

THE WITNESS: It appears two or three times I've seen "manipulate," that it's with addictive level.

Q. My only point of this exercise is, would you agree with me -- and take your time and look through the whole document. Every time that Reynolds says they don't manipulate nicotine, they qualify it with the phrase, "to addict smokers," don't they? Or something to that effect?

A. They usually do it -- from what I read so far in conjunction with the word "addictive" in one form or another.

Q. And in April of 1994, it's your testimony, is it not, that Reynolds did not control nicotine levels in its cigarettes other than through the reduction of tar, correct?

A. As far as I know.

Q. Do you know why this statement would not contain that simple proposition that Reynolds does not control nicotine?

A. No, I don't. It talks -- when it talks about

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tar and nicotine, it uses the word in reducing and it also talks about the public health officials in Europe wanting us to de-link that association.

Q. But it's your understanding that in '94 -- and forever as long as you know -- that Reynolds did not, quote, "control," unquote, nicotine levels for that specific purpose of controlling nicotine levels, correct?

A. I don't know of it.

Q. Why wouldn't this statement contain that proposition?

A. I don't know. I didn't write this document.

MR. BELASIC: Objection. Calls for speculation.

A. I don't know. I didn't write this document.

Q. Would you have put that in there if you were writing it?

A. Put what in exactly?

Q. That Reynolds does not control nicotine levels?

A. I would have put in here as they put in here that when you control tar, nicotine follows.

Q. Would you have put in here that Reynolds does not control nicotine for the specific purpose of controlling nicotine?

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A. I don't know what I would have put in there. I mean, I would not have been and was not the co-author or contributor to this document that discusses the historical use and policy of nicotine, quote-unquote, "control." I'm not the authority on that.

Q. Do you know if any of the documents --

A. So if I would have been the one to put stuff in here, I would have had to do it based on my knowledge.

Q. Okay. Do you know if any of the documents that I showed you yesterday or today were provided to the FDA in their document request that you cited in your testimony yesterday?

A. I sure don't. I don't know whether they were or not.

Q. Between yesterday and today, did you have the opportunity to look for the draft of the questions and answers that you said you prepared in response to potential questions that might be raised with respect to FDA regulation of nicotine?

A. No, I did.

Q. You didn't look for those?

A. No. Went straight home and came straight here this morning.

Q. Did your counsel ask you to look for

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those?

A. No.

MR. MAISTROS: Okay. Why don't we break for lunch?

THE VIDEOGRAPHER: We're going off the record at 12:20 p.m..

(RECESS TAKEN FROM 12:20 P.M. TO 1:19 P.M.)

THE VIDEOGRAPHER: We're going back on the record at 1:19 p.m.

BY MS. KNISELY:

Q. Doctor, as you know, my name is Sherrice Knisely and I represent -- also represent the plaintiffs in this case. I'll continue the questioning as Jack Maistros needed to catch a plane.

If -- as with Jack, if there is at any point in time you wish to take a break, please let me know. If there is any point in time that you do not understand my questions, please let me know and I'll do my best to make them understood. Okay?

A. Okay, very good.

Q. I believe we neglected yesterday to go into any detail into what you have been doing since June of '96. You've been senior vice president of R & D since then?

A. That's correct.

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Q. What have your duties included as senior VP for R & D?

A. Well, they include all oversight for the divisions in R & D. If you would like, I can tell you the areas that includes?

Q. Yes, please.

A. Starting with the most geographically distant, Avoca farms are under me. The administrative services which includes the building maintenance and the computers and the libraries, they are under me -- under a lady, Ms. Janet Wheeler?

The group called process technology and development which is engineers and processes and the research around that, that's under Mr. Ron Willard. The group that's called product evaluation, which is under Dr. Don deBethizy. The group that's part of my old group, product development and assessment which also includes chemistry is under Dr. David Townsend.

The brands group that we talked about this morning is under Skip Tensley, which is the brand liaison group, the specs group, the leaf group and the materials group. The scientific affairs group is in a group called health and environmental services which is under Dr. Bob Suber.

And then a new cigarette technology which is a

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group from which Eclipse came, under Mr. Jim Phillips. So those are eight reports, I believe. Okay?

Q. Avoca farms is what?

A. It's about a 2200-acre facility in Bayden [sic] County, the eastern part of the state near Albemarle Sound, about 25 miles south of Edenton -- southeast -- southwest of Edenton rather. It is a farm where we do some tobacco research, tobacco farming research and curing in barns.

It is a place that we also grow plants for flavors and fragrances for other industries. We have a number of contracts with flavor houses for other products other than cigarettes. And we have a Sclareolide business I referred to this morning for a compound out of clary sage, called Sclareolide which is made from Sclareol which is in the florescents. And they also make an ingredient for one of our international brands, a vanilla-like compound over there and that's the function of Avoca Farms. They have some commercial growth and sale of things like basil and other herbs. Peanuts, very limited -- just side money crops for the farms.

Q. With regard to the tobacco, you said there's farming research in curing done there?

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A. That's correct.

Q. Is that for tobacco used in Reynolds cigarettes?

A. No, it's for experimental purposes. We work closely with N.C. State University and farmer's co-ops, trying to help them find better ways to cure for quality, better ways to -- farming practices so that they get the maximum quality out of their tobacco. The leaf people here have an agricultural group that does some research over there. We also have some research projects to try to figure out how to lower nitrosamines in tobacco.

Q. What nitrosamines are in tobacco?

A. Well, there are a number of nitrosamines in tobacco like they are other plants, but the ones of most interest are NNN, NNK and NAT, what I'll refer to as tobacco-specific nitrosamines.

Q. Are any of those bioactive?

A. It is believed that they are, by many scientists, carcinogens. They are not classified as a known human carcinogen, but as a suspected carcinogen. When I've asked why, why they're classified as suspected, they are so ubiquitous in nature, in our diet -- nitrosamines are -- there is no way to determine whether they do or do not cause

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cancer.

Q. You say you have a research program with regard to the nitrosamines?

A. We had both over there and here, exploration of how to reduce nitrosamines in cigarettes.

Q. And when you say "over there," you mean Avoca farms?

A. Yes.

Q. And they are currently ongoing?

A. Yes.

Q. Who is in charge most directly of that research?

A. Mr. Brian Smeeton works with scientists over at R. J. Reynolds. He works with people like Dr. Call -- Bill Caldwell and Dr. Dave Townsend.

Q. You said that your duties include oversight of all the R & D divisions. What do you do on a daily basis?

A. I usually meet with one or several of those functional group heads to update on projects, update on activities, sometimes on budgets. I frequently get involved with questions from consumers, outside scientists. Almost every day I hear from some medical research scientist who wants us to fund or work with them on some project. Our reputation is

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quite well known, so I get a lot of requests.

Q. And what do you do with those requests?

A. Try to have them evaluated as to validity and explore the possibility of activity, if they are of good quality.

Q. And who evaluates that?

A. I usually give it to whatever -- whoever the most appropriate member of my staff is. If it's something to do with smoke chemistry, Dave Townsend will get involved. Something to do with additives or ingredients, Bob Suber will get involved. Depends on what the request is.

Q. Are the requests ever forwarded to CTR?

A. Yes, occasionally. If I think it's in their domain more than ours, I would forward it to them.

Q. And what is CTR's domain?

A. Well, they -- as I stated yesterday, I can't remember the eight or nine categories, but they have categories of projects on basic research and occasional applied, but it's almost always basic research in smoking and health issues or disease processes and organ systems that related to smoking and health issues.

And I can remember some of them. There is a group on immunology. There is a group on lung or

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pulmonary. There is a group on cardio -- there's a group of projects on cardiovascular, on cancer -- both lung cancer and cancer in general. There is an area on biobehavior, the aspects of smoking and/or nicotine in smokers.

There is a genetic or genetic predisposition group. And I believe there is a molecular biology group, but I don't know if that's all-inclusive. I may have left a couple out. Any annual report that they put out, they have them categorized.

Q. Do you have any annual reports --

A. Two.

Q. -- from CTR?

A. I have two, 1995 and 1996.

Q. I believe you said yesterday you have CTR files?

A. I have a file on CTR, yes.

Q. And where is that file located?

A. My office.

Q. And those annual reports would be in there?

A. Yes. At this moment one of them I believe is on my table because I had to look up something.

Q. If you could tell me, there was a production of document request attached to the

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deposition notice. Can you tell me what categories of documents you have in your office?

A. Well, I usually have a file on whatever projects are active. I have files on budgets. I have files on the personal information of my direct reports. We call those their PAF file. That's something -- personnel action form is what PAF stands for.

I have some literature files. Topics -- smoking health topics, other topics like nutrition. I have a file on coffee, for example. Things of interest. I have some presentations I have made. I have -- outside of my office in my secretary's office, I have newspaper articles where I have been interviewed or R & D staff has been interviewed or projects that we work on have been commented on by critics and/or supporters.

I have a file on a couple of consultants we have used, just any correspondence that they have sent me. And I think that pretty much covers it. I do have -- as I've already stated, I have files on different areas like P-10-D, for example or looking at how to improve the quality of leaf in our products as to processing. I have a file on that.

Q. And that would fit in your active

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projects?

A. That's correct.

Q. What other active project files would you have in your office or your secretary's?

A. Well, we have the files on Eclipse, files on that cigarette in Oklahoma.

Q. When you keep saying the "cigarette in Oklahoma," do you mean the Winston Select?

A. Yes, the style of Winston Select. The rest of the country has another Winston Select. The other Winston Select is the one that has that sugar casing that works better than ammoniation for making a product taste better, that I referred to this morning. But in my office, the file that I have on Winston Select is the Oklahoma City project.

Q. You said that the Winston Select that's had in the rest of the country has sugar casing --

A. Yeah.

Q. -- that makes it taste better than the ammoniation taste?

A. We were talking this morning -- Jack and I were, as you know -- about the theory that ammoniation might make a cigarette taste better and how much in debate that is. Well, the example I gave was sugar casing works better on burley than does

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reconstituted ammoniated sheet.

Q. Does the Winston Select in Oklahoma have ammonia in it for taste?

A. I don't believe so.

Q. Does it have any ammonia in it at all?

A. I don't think so, but I don't know for sure. If it has any, it's not for taste. It might have some DAP in its G-7, but I doubt it.

Q. I'm sorry. I didn't mean to cut you off.

A. That's all right.

Q. What other types of active project files do you have in your office or in your secretary's office?

A. I have to think for a moment what else could be there.

Q. Any Winston --

A. I have -- I have a file on nicotine and recent publications on it, including John Robinson's publications. I don't believe I have a file on reconstituted sheet. I'm sure I don't.

I have a file on a program we've got called Camel Light improvement and another program we call competitive signature. Competitive signature is a project -- our product developers are so good that we think we can meet or beat any brand style out there

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with their own consumer. And so far, we've been able to do that through blending and the use of flavors and the use of processed tobacco techniques such as gentle heating of burley before it goes into the blender. So that project is called competitive signature. It's in my file.

Q. Any other active project files?

A. We have a cost per thousand program where we try to minimize cost of our blends through typed process control so that there's no waste. There's no machine down times because of faulty leaf, faulty materials. That project is in my files. We have a project where expanded tobacco is improved quality-wise. That probably is in there.

I'm thinking -- we have -- there is a file in my office on this nicotine analog program that we call NRAD. The business interests we have in attracting a pharmaceutical company to use analogs in nicotine for therapeutic reasons. There is a file on that in there. I've already mentioned a couple of consultants whose files are in there. We have a cost control and administrative services file in there where we try to minimize library and computer cost.

We have a few presentations I've made on Eclipse and the cigarette in Oklahoma that are

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separate from the project file. They're just presentations that I've made at scientific meetings and with scientists. Those are published, but I also have a copy of the transparencies that we use in presentation. And I believe that pretty much covers what I've got.

Q. Do you have any files on sensory testing and evaluation?

A. No. Some of the Camel improvement and competitive signature could have some -- what's called SED results and/or consumer test results. The sensory evaluation discrimination committee, SED, where you try to see how different one cigarette tastes versus another one, whether it's a competitor's or ours.

And there may be SED panel results in there as well as consumer -- where we might go to a competitor's franchise, get their smokers and let them smoke their own product and let them smoke our new prototypes and give us a comparative judgment of the two. They don't know they're smoking their product. And they don't know that they're -- when they're smoking our prototype, that it's not their product. So it's blind testing. So those consumer results or sensory results might be in the context of

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those files I mentioned.

Q. You are Dr. Robinson's boss?

A. I'm John deBethizy's boss and John Robinson works for John deBethizy. If you saw Day One, ABC News several years ago, Don and John were on there together.

Q. And you are also Pat Lippiello's boss?

A. Well, Don's also Pat Lippiello's boss -- Don deBethizy is -- and I'm Don's boss. So I'm their boss's boss.

Q. You mentioned the sensory evaluation panel?

A. Uh-huh.

Q. When was that created?

A. That panel has been around since before I came because the sensory evaluation panel would have a party every year and that was ongoing when I got here -- where they thank the employees in the company for serving on the panel. So I know it's been going on at least since '84 and probably before.

Q. Are there always RJR employees on the panel?

A. Yes. Now, there is another panel that Doug Webber established which looks at some of the same things. You know, taste, quality, harshness,

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smoothness, after-taste, draft -- which is called draw for them. That panel -- there is a panel of outside people who smoke other brands that are called in from time to time to give their opinion like the SED panel does on a particular cigarette or prototype of cigarette. But most of that is done by the SED panel and most of those are employees -- or those are employees by R. J. Reynolds.

Q. How does a person as an employee of R. J. Reynolds get on an SE panel?

A. SED panel? They ask to be on it. It's -- people tend to enjoy it. It gives them a feel for what's going on at Reynolds in product development so they like to know that.

Q. Are they --

A. And it gives them a chance to express an opinion on what kind of cigarettes they think we ought to be making.

Q. Are they compensated for in any way?

A. I don't think so. I'm pretty sure they aren't. They might -- they might get a party once a year, but that's about it.

Q. How many employees at any one time are on the SED panel?

A. It's usually less than 20. I think they want

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at least twelve when they meet. Obviously everybody's work schedule is such that all 20 -- or approximately the 20 aren't always there. But they have a bottom case number, they won't meet unless they have so many there.

Q. How often --

A. And I'm not sure how many that is, but it's probably around twelve.

Q. How often do they meet?

A. Whenever there is a project that has some prototypes, so I'd suspect they meet at least a couple of times a month, but I don't know. I'm guessing, of course. I've never been on that panel. You have to be a cigarette smoker to be on that panel and I've never qualified since I'm a pipe smoker.

Q. Do you have to smoke a particular brand to be? Or a nonRJR brand to be on the panel?

A. Nope. You don't have -- there is no brand requirements. Once in a while, we may ask employees in the building if they are a ULT or a low tar cigarette smoker, would they call one of the people in the SED resources division to volunteer to be on a special call panel.

Sometimes we're more interested in what an ultra low tar smoker thinks than we are other people.

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And so on a rare occasion, we will send out a request for people who can smoke our brand or anyone else's brand as long as it's under seven milligrams of tar.

Q. Does Reynolds have a smoking policy in its facilities?

A. Yes. There are some areas you can't smoke in because they are chemical labs or they're analysis labs and nicotine in the air can mess it up. Or the fire cone in the cigarette might be around flameable -- flammable reagents used in chemistry labs.

In the animal rooms, we don't want smoking around the animals because they could absorb nicotine or cotinine from the air if there's a lot of smoking around them, and that could mess up experiments. So we have certain areas that smoking is not allowed for research and testing reasons.

Q. Other than for research and testing reasons, are there any restrictions on smoking in Reynolds' facilities?

A. No official ones. There are some people who prefer you not smoke in their office, so they usually let you know, but there are very few. Most people there allow smoking anywhere.

Q. Do most Reynolds employees smoke?

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A. Yeah, I believe they do. Yeah.

Q. Does Reynolds provide cigarettes to its employees?

A. They have to buy cigarettes either through their own grocery store or curbside service. Or they can buy them through the gift shop there, which are taxed and have all the things that any other store has. But because the gift shops are by the work areas, it's convenient for them to buy in those shops. And they can buy things like chewing gum and candy and lighters and soft drinks and tee shirts and stuff like that they can buy there in those gift shops.

Q. But Reynolds doesn't provide them at a discounted cost or --

A. No. If we're doing -- for example, on prototypes of Eclipse, when we were studying Eclipse so heavily, we might have people smoke Eclipse for two weeks or a month and we let them have those free.

Q. Even on the line in the plants --

A. There is a program where they can buy through the gift shop, cigarettes.

Q. Does Reynolds sponsor any smoking cessation programs for its employees?

A. No, I don't know of any. Now, Health Care is

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our HMO. And people can ask for involvement in smoking cessation program over there, as I understand it.

Q. Is the HMO a Reynolds HMO?

A. It used to be. They sold it to a bigger North Carolina HMO group last -- a year before last, I believe.

Q. Prior to its sale, did the Reynolds HMO provide for smoking cessation?

A. I believe they did. It's, you know, doctor by doctor in their program. I wasn't familiar with it, but seems to me that if you wanted to quit smoking, advice and access to a program was available through our HMO.

Q. And do you know what programs they used?

A. No, sure don't.

Q. Do you know if they used nicotine replacement programs?

A. Don't know. I -- I'm just making an educated guess or a speculation as to the existence of that. I'd heard that they do have, if you wanted to quit smoking. But most Reynolds employees and most of the physicians over there appear to believe if you want to quit, you will do it. But they will offer you assistance, as I understand it, if you want it.

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Q. You mentioned Doug Webber also has set up a panel for sensory evaluation. When did he first set up his panel?

A. Well, he's inherited it from R & D. Doug Webber is a member of the marketing group and I believe it was 1993, the head of brands R & D, Joe Inman and Doug Webber who worked for the retail data team downtown and worked with marketing, Carl Ehmann, the head of R & D and Jim Shrarer, the head of marketing had a meeting, the four of them did -- Joe Inman, Carl Ehmann, Doug Webber and Jim Shrarer. And they decided to move the SED panel under Doug Webber from R & D.

Q. So there are no two panels? There's only one panel?

A. There's one panel. There can be these special panels I described, but there is a standing sensory evaluation discrimination panel called the SED panel.

Q. And then Doug Webber will occasionally have his own panel?

A. If we -- we will occasionally ask him to get competitive smokers in, recruit them.

Q. Uh-huh.

A. Sometimes they use a local recruiting firm. Sometimes they do it themselves. And ask them what

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we think -- what they think about one of our prototypes. But that's very rarely, just once in a while.

Q. When was that first done to your knowledge?

A. Well, I asked -- when they formed this SED group under Doug Webber and moved it from R & D, when I was on a trip and I got back, I called up Doug and said, "That's fine, but would you do me a favor? Would you try to develop a panel of competitive smokers?" And he agreed to it and he did. He developed that panel.

So our product developers on infrequent basis may want to know what Marlboro Light smokers or Kent smokers or New Port smokers or whomever think about one of our prototypes.

Q. Can't they do that with RJR employees?

A. They could do it with RJR employees, but they'd have so few subjects. Our employees overwhelmingly smoke our brands. And I don't think you could get a panel together of competitive brands. Our employees are very loyal to our brands.

So I mean nobody makes any of our employees smoke our products. There is no pressure whatsoever, but since they believe in the company, they tend to

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smoke our own brand. So if you wanted RJR employees to give you an opinion as a Marlboro smoker or New Port smoker on one of our prototypes, I don't think you could get enough of them together to have a parade, much less a panel.

Q. How large is the panel for outside competitors when it's put together?

A. I don't know. I think it's the same size as the SED, probably 20 or less people, but I really don't know. That's a speculation.

Q. How many RJR employees are currently eligible -- just an estimate -- for the SED panel?

A. Mostly R and D people and people at Whitaker Park and people at Shore Fair. Those are two production facilities near R & D. If you want to drive down from Tobaccoville, you can -- for any kind of panel, SED or any other. In case of competitive panel, it's my understanding -- I know you have to go to nonRJR employees.

Q. Uh-huh.

A. It's my understanding if you live in the area, you're eligible for that one.

Q. Now, do they always consist of nonRJR employees?

A. Primarily, if not exclusively. There could be

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spouses of RJR employees that smoke on them. That's very possible.

Q. But if an RJR employee smoked Marlboro and volunteered for the outside competitors panel?

A. He could probably be on it or she could probably be on it, either one.

Q. But that's rare?

A. I would expect so. I -- this -- we talked earlier today about this April, '94 document and the mention of the nine patents in there. That particular program was headed up by Watt Dufour. And he was also interested in making a product that was -- as another project -- that was equally acceptable to Marlboro Light smokers.

So he walked around for a couple of months smoking Marlboro Lights and it was really a weird visual experience because I had never seen that before at Reynolds. So I remember thinking about that time -- which we're talking probably 1991, I remember starting to watch and see who I could see smoking other brands, and I haven't seen two or three people doing it. And Watt quit doing it when he got. through with that project.

Q. You said there's a nicotine analog program? NRAD, I believe you called it?

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A. Uh-huh.

Q. When was the program created?

A. I can give you a best guess. In 1990 -- late 1990, Bob DiMarco asked me to attend a meeting with a company that had a pharmaceutical wing or a division in it as its whole family. And to talk to them about were they interested in our analog program. So the analog program had to probably predate that by a couple of years. So I would imagine '88, '89 had started, but I really don't know. Because they had data to discuss their findings with this firm.

Q. To date, have there been any nicotine analogs developed by RJR?

A. Uh-huh, yeah.

Q. Could you list those for me?

A. They -- no. I can give you -- there's one of them's called 2403, its number, but they are confidential and proprietary. We have patents on them. You can look up the patents.

MS. KNISELY: There is a protective order in terms of highly secret and highly confidential, if you want to designate this portion of the transcript that, Mark.

A. There are only numbers I can give you, and 2403 --

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Q. If that's the way they're coded, then the numbers are fine.

A. Well, the only one I can remember off the top of my head is 2403. I think there's a 2416 and a few -- but I don't remember the numbers.

Q. How many have there been?

A. At least 16 patented. And then you probably know this -- I don't know how much patent background you have, but you can take one compound and patent it for different disease uses. And some of these are patented for four different disease uses.

MR. BELASIC: As I stated yesterday, I'm going to designate any of the reference to nicotine analogs as highly confidential under the protective order. I'm sorry -- as confidential under the protective order. Doesn't mean that I think it's relevant. I'm going to make an objection to relevancy. The nicotine analogs deal with the treatment of disease and it's not relevant to smoking and health, but you can continue.

Q. Have any nicotine analogs ever been used in the production of cigarettes?

A. No.

Q. Have --

A. One -- one -- one of the analogs is a natural

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constituent of tobacco leaf.

Q. And what --

A. At very, very low levels.

Q. And what is that?

A. 2403.

Q. And you can't tell me the name of the substance?

A. If this is protective, I could.

Q. Yes, it is protective. You can go ahead.

A. Metanicotine.

Q. I'm sorry?

A. Metanicotine. It's one of the metabolites of nicotine in the plants. You know the plant has alkaloids, nicotine and many others -- the tobacco plant does. Eggplant, pepper plants do, too. And metanicotine is one of the small constituents of the alkaloid family in the tobacco leaf.

Q. Has RJR ever synthesized or studied biosynthetic nicotine?

A. I don't know.

Q. Since you've been there?

A. I don't know if an analog -- see you can -- you can -- what's the most scientific correct way to say this? You can design the molecule on the basis of what you think it would do biologically or

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physiologically or pharmacologically and then try to have that synthesized. And our analog programs do that. They design it, computer-design it and then have it made. And we might make it or we might have someone else make it.

Q. But I'm not talking about a nicotine analog. I'm talking about biosynthetic nicotine.

A. I don't know of any such animal in RJR since I've been there or before, but I don't know of any.

Q. Would there be any purposes to developing that type related to tobacco or cigarettes?

A. Not for cigarettes. Theoretically if you biosynthesized nicotine like in an E. coli bacteria or in a tobacco plant through mirror stemming or through gene virus probing, DNA probing. Theoretically you could program a tobacco plant to make that synthetic nicotine, if you could figure out the pathway -- the enzymatic pathway. Theoretically you can make the tobacco plant make beta carotene, vitamin C and other things.

Q. But for the purpose of producing and manufacturing cigarettes, there's no purpose for biosynthesizing nicotine?

A. Not that I'm aware of, sure isn't.

Q. Could biosynthetic nicotine be used to

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control nicotine levels?

A. I don't know. Theoretically --

Q. If one want --

A. Theoretically they could. I'm sitting here trying to remember discussions I've had years ago. I like orchids. I don't have but a few in my office. And there is a process of orchid hybridization called mirror stemming. And I've asked our agronomists, "If you wanted to have a tobacco leaf, a plant, that had the assets or properties that are good of flue-cured and of burley and of Turkish in one plant, is that possible through "geneware" as they call it, through gene probing or through mirror stemming or through some other process -- biosynthetic -- synthesizing process?"

The answer was, "Theoretic. If you understood what you wanted in that single tobacco plant theoretically." And they asked me what would I want. And I said, "Well, I assume I'd like the sugar of flue-cured and some of the alkaloid properties of burley and some of the slight pungency of Turkish."

And they said, "Well, you'd have to decide exactly what -- I mean the sugar is simple enough. You'd have to decide what gives the bite of burley and the pungency of Turkish. And if you understood

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what chemical in the leaf does that, what natural chemical, then you could theoretically use genetic tools to get it. But you'd have to know what it is exactly you wanted before you do that."

So I'd say theoretically if you decided you wanted a tobacco plant or E. coli or some other biological process to synthesize some compound -- artificial compound or natural that was like nicotine but not like it -- it's possible, but we don't have any work like that.

Q. Has RJR ever studied biosynthetic nicotine?

A. I don't believe so. I don't know of any example of it.

Q. If they had studied it, what might they have studied it for?

MR. BELASIC: Objection. Calls for speculation.

A. If they had studied it, the only reason they would have studied it is to see if it was possible to make tobacco that was minimum in nicotine for taste and minimum in tar. It would have been an effort to lower tar and nicotine if they had studied it is my speculation.

Q. You had mentioned yesterday and today a

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Dr. Ehmann?

A. Yes, Carl Ehmann.

Q. Dr. Ehmann is not a current employee of Reynolds, is he?

A. No, he's not.

Q. Do you know when he left?

A. Yes, I do -- since I took his job. He left early June, 1996. I mean he came in and out until the end of June, but he left the office and got his house ready for sale.

Q. And as of June, '96, he was senior vice president of R & D?

A. He was executive vice president of R & D because he had some international R & D under him.

Q. Do you know why Dr. Ehmann left Reynolds?

A. When he -- I didn't at the time. He said he'd tell me later. And he told me later that because Jim Johnson left. Jim's the one that recruited him and he liked working with Jim. And when Jim left, he didn't want to stay either.

Q. Who replaced Jim Johnson as CEO of Reynolds?

A. Andy Schindler. Andy was president of domestic and he's now CEO of domestic. Jim's job had TI, Tobacco International and domestic. So the domestic

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company's CEO stuff, Andy Schindler has. That was under Jim Johnson, now is Andy Schindler.

Q. And who has the T.I. portion?

A. Pierre de la Basheer, a very fine French gentleman.

Q. Was there anything in particular that Dr. Ehmann might have told you about with regard to working with Andy Schindler that he did not care for?

A. Let me think what he said. He told me he thought Andy and I would get along very well. We both -- we both like a good argument. And that he's not -- he's not very good at arguing. And that he thought we would be well-matched.

He said, you know, he got along with Andy fine, but he didn't really want to work here without -- Jim Johnson is the one that recruited him. And he didn't want to work here without Jim Johnson.

Q. Do you know what Carl Ehmann did when he left Reynolds?

A. Yes. Well, for about a month, he was looking at several jobs as I understand it. He had several offers and he -- I think by the fourth of July in '96, he had decided who he was going to work for. And because he's a dermatologist, he wanted to work for a company that had dermatology products, skin

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care products.

Q. Uh-huh.

A. But would love it to be a company that had other products as well. And I can't think of the name of the company, but they have skin care products in England. They also have Brasso and Woolite and some mouthwash -- I done forget which one. I believe they have toothpaste. A number of personal care products as well as some cleansers and detergents.

They have these scent wicks that you can use to release aroma into a room. They have one of the scent wick products. I can't remember the name of the company, but it's in London -- headquartered in London.

Q. For how long had Carl Ehmann worked at Reynolds?

A. About four and a half years, I believe. His first six months was very unusual, but I think it was done well. Bob DiMarco was still here as head of R & D. And it was Carl's wish and Bob's wish that he run R & D until the day he left, until his ten years were up, his contract was up.

So Carl from late April, early May until late summer an office in R & D and he had one downtown. And he learned the company and the R & D projects,

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but he was very careful not to act like he was our boss yet until Bob DiMarco left. It was very courteous of him and I didn't think it would work, but it worked very well.

Q. Do you know why Reynolds did not renew DiMarco's ten-year contract?

A. He was 65. They kept him on as consultant for a while. But they -- if they had been unable to find a replacement that was acceptable for Bob DiMarco, they probably would have asked him to stay on a couple of years -- but they found Carl Ehmann.

Q. You mentioned also D. H. Piehl?

A. Don Piehl?

Q. Yes.

A. Yes. I did mention him.

Q. When did he -- when did he leave Reynolds?

A. I'll have to give an answer to the best of my memory, so please don't hold me to precise dates. But I believe in early 1989, late '88, somewhere in that vicinity, Don Piehl left the head of the department he was over.

Q. What department was that?

A. I don't remember the name of it. I think it was product assessment or something like that. Had

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some chemists and product developers in it and that sort of thing. But anyway, he became the head of R & D for Heublein Spirits.

Q. Head of R & D for who?

A. Heublein. You know, wines -- Eaglenook wines. They had Moose Head Beer. We owned them as a company. We later sold them, but he went over to be their R & D chief while we still owned them -- up in New Jersey somewhere.

Q. Is he still in that position?

A. No, he's not. Last I heard, he was working in Ma aysia for a tobacco company. Indonesia or Ma aysia, I think it was. It's Indonesia, I believe.

Q. And who did you hear that from?

A. Him. He came by to see me about a year and a ha f, two years ago.

Q. Did he tell you how long he planned to stay?

A. With that company?

Q. Yes.

A. He hoped at least three to five years, I believe is what he told me. Came by to see me to ask if there were retired RJR R & D employees that might be interested in a temporary assignment.

Q. Are there different G-7s?

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A. Yes. There used to be a bunch of them. There are not very many anymore. I remember asking Dan Pugh in 1990 when I became head of advanced technology products for a code, what each G-7 was, what reconstituted sheet it was.

Q. Do you have a list of what the G-7s were?

A. Not in my office area. It would be over in central archives if I have one. Certainly Dan Pugh had one when he had PT&D. And it included many G-7s we never used commercially that they were looking at to see if we could make better tasting cigarettes out of them.

Q. You said one of your current duties is oversight over, I believe, the libraries at Reynolds?

A. Yes. Janet Wheeler, Ms. Janet Wheeler is in charge, among other things, of the library and the archives of the library.

Q. Does Reynolds have a document retention policy?

A. Well, they have -- you know, don't shred documents. Keep them. If they're not active and you're through with them, send them to the central archive center. If you don't need a document and you want to throw it away, make sure that there is a copy of it somewhere. Some I guess that's a policy. I

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mean I'm sure there is some kind of policy written down somewhere. I don't tend to pay attention to it. Just use the common sense and don't throw away anything away you shouldn't.

Q. Would reports, R & D memos, CIM memos be those things one shouldn't throw away? Copies of?

A. Yes, or at least be -- if they know where the original is, they can -- why keep a bunch of copies of the same document as long as they know it's in our files.

Q. And when you say "in our files," do you mean in the central archives?

A. Either in someone else's files or the central archives. All the files that people keep end up in central archives. We tend to keep them two or three years in our office areas and then send them over. Just earlier this year, my secretary reminded me I had some files that were over three years old so we sent them to the central files because I wasn't using them anymore.

Q. If you had a document -- say, an RDR memo or an RDM memo and there were a number of people copied on it and you were one of those copied and yours was clearly a copy, what would be the policy at Reynolds before you destroyed that copy?

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A. Well, first -- if it's an RDM, I would verify it was in the library. And then, if I didn't need it anymore, I would throw it away. If I had -- knew it was a copy, but that copy had a number on it, then I'd send it over to archives when I'm through with it.

Q. And when you say if it had a number on it --

A. The --

Q. RDM-64, RDM-65?

A. No, the RDM would have a number and you could tell whether yours was the original or not by the color of the stamp on it.

Q. Ah --

A. If it has -- because they come through my office and all the other scientists' office every six months or so and copy files --

Q. Uh-huh.

A. -- when it's copied, my paralegals -- you have to keep it whether or not you want to. The only thing you can do to get it out of your office is put it in central archives.

Q. Ah.

A. But if you throw something that's got a copy on it, you're a bad boy. We have on occasions -- if we

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have a court case, Dan Donahue that you saw peek in here will send out a message to RJR employees that if you have documents relating to the following issues, you must keep them until you hear otherwise from him whether or not they are copied.

Q. Okay.

A. I've known of at least two or three instances in the last two years of that. Which really provokes my secretary because she's a neat freak and I'm a clutterer. And then when she gets a letter from -- I get a letter from Dan Donahue, she doesn't like it.

Q. Gives you an excuse not to clean up the clutter?

A. She just told me this morning -- I had to do some work on the way here. Over the phone, she just told me, "I got your blank office cleaned up and I expect you to keep it that way for a while."

Q. If you verified or if you checked with the library, the central archives and you had a copy of an RDM and the original was not in the library, what would you do with the copy?

A. Hang onto it.

Q. Would you make sure that the library and the central archives got a copy?

A. I would -- I don't know of any instance where

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that's happened. I thought I was going to have to do that one time because I had a copy -- one of my people had a copy and I saw it of one that we heard was not in the library for some reason, but turned out it was.

So I said, "Well, we got to take this and make it in the library. And if you need it for your work, you can get a copy of it. But your copy may become the central copy." But it turned out they had the original.

Q. When was the central archives to the library at Reynolds set up?

A. I don't know. It's been a long time, but I don't know when it was set up. I was aware there was a central archive in '84. I don't know if it had the same name then as it does now, but I don't know when it was set up.

Q. Does Reynolds have a policy where it ever goes through the central archives library? First of all, is the library and central archives the same thing?

A. No. The library files are the original RDMs.

Q. Uh-huh.

A. They also have -- if I order a reprint of a publication --

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Q. Uh-huh.

A. -- they -- it goes through them and they keep the original and give me a copy. And so they have the RDMs and the RMDs -- research memo, something like that it's called.

Q. The RDRs maybe?

A. Pardon me?

Q. Research and development reports? The RDRs?

A. Yeah, they would have those. There is some kind of research memos also they have. I can't remember the name of it. But they have RDMs and some sort of research memos and the thing you mentioned.

Q. Do they have CIMs?

A. I believe they do.

Q. And they keep originals?

A. Yes.

Q. Do they ever destroy the originals? Is there any occasion that they're destroyed within the regular course of business?

A. Not that I'm aware of. I think they keep them. I think they're very religious about that. We're very proud of our reports and our archives, so we want to keep them. If we keep publishing at the rate we've been, we're going to have to buy a warehouse

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somewhere to start keeping them in.

Q. Now, you said the central archives is different than the library. What is the central archives?

A. It's -- I don't know where it is or even what it looks like, but it's where I send my documents. It's a central archive document center.

Q. Before you send them there, do you make sure the library has the original of whatever documents you're sending the central archives?

A. If it's appropriate for the library to. If I have a presentation or a literature article that came to me from some other source -- for example, if Dave Doolittle gave me a reprint of one of his publications, I don't worry whether the library's got it or not because I know they do. But if it's an RDM or one of the other documents the library keeps, my secretary -- she and I came up with this as soon as she started working for me, and she's been working for me twelve years. She checks to see if the RDM is in the library or whatever the research document is.

Q. Does the central archives ever through the regular course of business destroy any documents?

A. I don't think so.

Q. How long has the central archives been

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established?

A. I don't know.

Q. Since you've been there in '84 at least?

A. I think so. I don't know if it had the same name, but there was a central depository for archives. It probably had the same name. I just don't know.

Q. Is there --

A. I became, Sherrice, very aware of it when I had been here long enough to have people who published. Prior to that, I just had a vague understanding of it. Janet Wheeler can probably help you with that.

Q. Is there a list in the library of all the RDMs, RDRs, CIMs that have ever been created?

A. Probably.

Q. And Janet Wheeler would have possession of that list?

A. She'd have access to it. She probably doesn't keep it in her office. It's probably kept in the library.

Q. Do you know anybody else who has such a list?

A. I suppose whoever manages the documents at central archives has a similar list for their documents.

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THE VIDEOGRAPHER: Ms. Knisely, we have five minutes left on the videotape.

Q. The central archives -- do you know if their list, is that just by boxes that you send? Or when you send the documents to central archives, do they actually add the document itself, each individual document, to a list?

A. They probably do. I don't know. It's kind of frustrating to not be able to throw documents away that you know you don't need anymore. So I haven't become acquainted with the process. I've just accepted it.

Q. Do you keep any list of RDRs or RDMs or CIMs?

A. No, there's -- I can get it from the library so I don't keep it, sure. If I want an RDM on any subject matter, I call Helen Chung and ask for it. It helps her if I know the number of the RDM or the author of it and the year of it. And if I do, I'll give it to her, but usually I ask her for any publication or RDM on a given subject.

Q. What is high nicotine extruded tobacco?

A. High nicotine extruded tobacco?

Q. Uh-huh.

A. I don't know. High nicotine extruded tobacco.

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The only extruded tobacco program I was aware of was one of the groups that worked for me was seeing if extruded tobacco would be a good substitute for either G-7 or puff tobacco. There were a few people who thought some of the extrusion techniques used in the food industry to make like bread sticks and that kind of stuff might be worth looking at for making tobacco sheets or tobacco strands out of tobacco scrap.

I know of none of those -- those programs that I was aware of. Lila O'Connor had that when I had my product development group. Never heard anything about high nicotine with that.

Q. And the only possible reason that you can think that RJR might have been studying high nicotine extruded tobacco would be with regard to G-7 as a substitute for G-7?

A. I don't know why they would have been studying high nicotine extruded tobacco. The reason we looked at extruded tobacco, and it wasn't high nicotine, was to see it as a replacement for G-7.

(DEPOSITION INTERRUPTED BY TELEPHONE.)

A. We have looked at extruded processes for a project that we're working on for the future to see if we can make an Eclipse-like cigarette that burns

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down. And then there, we look at starch like rice starch because it produces less unwanted compounds when you burn it than protein does or a laxis do or anything like that. So we're looking at extruded tobacco and starch, and it's not high nicotine either, to see if it will cut well.

MR. BELASIC: This is probably a good time to stop because that's somebody saying Steve Sheller wants you to call him right away.

(DISCUSSION OFF THE RECORD.)

THE VIDEOGRAPHER: We're going off the record at 2:18 p.m..

(RECESS TAKEN FROM 2:18 P.M. TO 2:36 P.M.)

THE VIDEOGRAPHER: We're going back on the record at 2:36 p.m..

BY MS. KNISELY:

Q. Doctor, you talked yesterday about levulinic acid?

A. Yes.

Q. And testing that was done by Reynolds with regard to levulinic acid --

A. Uh-huh.

Q. -- in reference to the European view of tobacco nicotine ratios?

A. Right.

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Q. When did Reynolds start testing levulinic acid?

A. If you recall, I talked about us looking at a cigarette put out by a competitor in Europe called Rothman Specials. And at that point in time we became -- it sort of encouraged us that we would probably make one that was not as harsh as that one. And so we started looking at what flavors or organic acids especially those normally in leaf could be used to reduce the harshness of cigarettes that had higher nicotine in them than their respective competitors in that same tar category.

And we believe that the European public health committee was correct, that a better thing to do is have maintained nicotine, low tar. So all those factors together made us start looking seriously at how would you have a cigarette with a tar to nicotine TN ratio of less than 10 to one.

Q. When you said to decrease the harshness with higher nicotine, when you say "decrease harshness," you mean --

A. High alkaloid tobacco, high nicotine tends to be harsh. That's why I struggle logically with ammonia accusations made because it will raise pH, raise alkaloids, raise harshness. And smokers don't

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like that. Makes a cigar out of a cigarette so to speak.

Q. When did Reynolds first make a decision to study whether they could maintain the nicotine -- high nicotine or -- strike that. Whether they could maintain the nicotine level while lowering the tar level?

A. I don't know the exact date. I was in toxicology at that time, but activity -- I seem to recognize activity of product developers saying, "Well, how would do that? How would we do what the Hunter Committee wants done?" Or the Froggart Committee at that time. And I would say that was what I saw as the start.

(DEPOSITION INTERRUPTED.)

Q. And when was that if you can give me an approximate year how soon after you started?

A. Probably late '88, early '89 I would say.

Q. Was levulinic acid the only substance that was tested or studied in that project to maintain nicotine while lowering tar?

A. They looked at probably half a dozen to 10 or 11 compounds to see which one would not have negative taste impact. Levulinic acid tended not to be -- it was the one with the least negative taste impact.

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But after we started developing a cigarette those patents are based on, we found it had a metallic after-taste that smokers didn't like.

And if you smoked it a while as a smoker, you began to recognize that metallic note while you smoked as opposed to after you got through smoking. So not only did it have a metallic after-taste for many smokers, it acquainted them with that taste so they recognized it. After they smoked a pack or two, they began to recognize it as they were smoking the cigarette.

Q. Do you remember -- and so that's why the project was not continued?

A. Yeah. That's -- we thought, well, okay, you know we tried to rescue it by saying, "Okay. How many smokers recognize metallic after-taste?" Because we thought maybe, you know, based on looking at these cigarettes in R & D and having different people smoke it, it seemed to us to be about 20 to 30 percent of the people recognized the after-taste and the others didn't.

But what we found out later, you know, as we developed it is people become acquainted with it and begin to recognize it. So that percentage grows until just about every smoker complains about the

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metallic note in it.

Q. Was levulinic acid ever studied in combination with nicotine, the effect on nicotine?

A. They were concerned -- some of the chemists were concerned that people would accuse us of doing something like they accused others of with ammonia. So they were looking at those nicotine form of salt with levulinic acid. It does -- nicotine levulinate, but it didn't seem to affect in any way the yield of the cigarette. So we had that data in case we ever went commercial with that cigarette, but we never did. So we didn't have to use that data.

Q. So did they in addition to checking the yield -- and that was in the end smoke?

A. Yes. The machine smoking, yes.

Q. In addition to checking the yield, the nicotine yield, did they do any blood or urine tests for nicotine in the blood or cotinine in the blood?

A. We would have if we had come up with a product to go commercially, but I don't think we did because we didn't get that far. Had we been successful, we would have done that.

Q. Did they study anything with regard to the absorption of nicotine by the body?

A. No. I think they tried to look at the

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particulate nicotine versus the vapor nicotine and found that it was about the same. Maybe you know instead of 95 percent particulate, it might have been 94 percent -- very little change. I don't remember the results, but we just assumed people would accuse us of trying to increase the free nicotine as opposed to having the same amount of free nicotine.

So we wanted to see what that would look like if you did that experiment. Wasn't much different so we felt like it would have been fine. And had we gone on successfully with a product to be developed, we probably would have done -- I'm certain we would have done nicotine blood levels.

Q. So let me make sure I'm clear on this. Levulinic -- there was no effect of levulinic acid on the absorption rate of nicotine in the body?

A. We don't know. We didn't look, but we don't believe there would have been. Because the chemistry that we did with nicotine levulinate or levulinic acid in cigarettes didn't show very much difference so we didn't think it made a difference. But we never did absorption studies.

Q. Did you do transfer studies?

A. Not that I know of.

Q. No transfer studies of levulinic acid on

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the effect of nicotine transfer in the body or to the body?

A. Not that I know of. If it happened, I didn't know about it.

Q. Did you do any studies of a combination of levulinic nicotine for transfer?

A. In the body?

Q. Yes.

A. Not that I know of.

Q. Did you do any such studies for absorption?

A. Not that I know of in the body, no. Well, absorption at all. It would have to be in the body.

Q. You said there were six to 10 or 11 other compounds that were tested with regard to the project to maintain nicotine and lower tar. Do you recall what those compounds might have been?

A. I think one of them was, you know, acetic acid. There's a little bit of acetic acid in tobacco. I think citric acid or citrus acid was looked at. Maybe ascorbic acid like is in oranges. There is some in tobacco. I don't know what other salts or acids were looked at. It seems to me a calcium salt or two was looked at, but I don't remember what they were. I remember they were chalky.

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Q. Were --
A. And since chalk is calcium carbonate, I guess they would be.
Q. You said that levulinic acid was not used commercially. Were any of the other compounds that were tested in that project used commercially?
A. Not that I know of. Some were -- most were in tobacco leaves, but there were none used commercially as flavors or ingredients that I'm aware of.
Q. And why is that?
A. We didn't have a reason to use them. The only people I know that looked at citric acid -- or citrus acid as come people call it, which is one of the compounds -- for commercial reasons were Duke university. They believe that organic acid that's in the diet like citric acid would give the mouth sting that smokers like and could be used when smokers couldn't smoke or maybe even used in smoking cessation. We followed their publications. They're the only people I'm aware of that were interested in trying to commercialize any of those natural acids we looked at.
Q. When you said there was no reason to use them, why did you study them if there was no reason to use them?

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A. Because we used -- it's a point in time. We were looking at those acids and picking the one. And the one we picked was levulinic acid.

Q. Levulinic. So that --

A. Had those scored better, we would have studied them.

Q. So they did not affect the nicotine level?

A. I don't know about the nicotine level. They didn't affect the taste positively. They had a negative taste.

Q. So they were all -- all of the compounds that were examined were eliminated in favor of levulinic acid?

A. Yes, as far as I know they were.

Q. Do you recall when the work with levulinic acid ended?

A. Late '91, early '92, I would say. The patents may have been along then or after then because of the process of patents. So they may not -- when we stopped working on it may not duplicate the time the patent was issued. That tends to be a year or two later.

Q. Does levulinic acid affect the physical properties in nicotine?

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A. We -- as I told you about 15 or 20 minutes ago, we did do some physical chemistry on levulinic acid with tobacco and looked for the effect of nicotine levulinate. Not only looking at levulinic acid itself, but what if you formed nicotine levulinate in the tobacco, what would that be?

And we saw a slight but debatable change in free versus nonfree tobacco -- nicotine. And it was like -- it wasn't statistically significant. And the chemists argued over whether it was real or not. And it was so minor that it didn't matter anyway because our taste panels were thumbing it down and said they didn't like it because of that metallic taste.

Had we had a real good taste in cigarette, we would have run down for sure exactly what effect, if any, on the physical form of nicotine would have occurred. Whatever was there was very minor, if real at all. But since the cigarette didn't do well, we gave up.

I remember listening to our chemists argue about the way free nicotine is -- so called free nicotine is measured. What I call vapor nicotine, whether it's real or not. I sat and listened in a room about this size to them argue about the precision of the measurement and whether it's an

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artifact of the sampling. And I remember thinking, "Well, the differences are so minor, I don't even think they're real, so who cares?"

And then later, a couple of weeks later where we were in the taste of that cigarette, I really didn't care at that point because it didn't taste very good. We're very aware of the literature and what people believe we're up to, so we tend to be our own worst devil's advocate.

Q. What is the trigeminal nerve? T-r-i-g-e-m --

A. Trigeminal nerve.

Q. Trigeminal nerve. Thank you. What is the trigeminal nerve?

A. Well, it's a nerve that -- it's one of our cranial nerves. When I say ours, some animals including us, the trigeminal nerve shares branches with -- I think it's the hyoglossal nerve, but some of the cranial nerves share branches and it's certainly true in people. But it's important for smell and taste to be specific, trigeminal nerve is. And once some branches of it go to the nose and some go to the mouth.

And so when you have an anosmic person, they can't smell and they usually don't like the taste of

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food because they can't taste it. I mean they're not into spicy food or anything because they can't tell any difference. That's why they're usually thin. Anosmics are usually thin. So the trigeminal nerve in --

THE WITNESS: Okay. Do you want me to repeat the part you missed?

THE COURT REPORTER: No, go ahead.

A. The trigeminal nerve in some animals like birds is very separate. It isn't shared by other cranial nerves. And I think -- well, yeah, you can take a rodent like the hamster and you can cut the trigeminal nerve to see what sensation in taste, whether it be for smokers or other people, is not related to smell but is all related to mouth properties, sensory properties.

So a lot of times people do research like the University of North Carolina in anosmic people that can't smell to see how much irritation effects are related to odor. That's the trigeminal nerve.

Q. Did RJR ever study the sensitivity of the tri --

A. Trigeminal nerve.

Q. -- trigeminal nerve?

A. Yes. Dr. Jimmy Walker, he had a pigeon colony

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that we kept in the animal facility for him to look at how much irritation in the mouth and nose was due to what, whether it was taste and mouth feel or whether it was odor. He looked at that effect in pigeons. He had a lab animal veterinarian come over from Bowman Gray and help him make those birds anosmic so they couldn't smell. And he would test in birds that could smell versus birds that couldn't how much irritation smoke was.

He followed the work over at UNC Chapel Hill with anosmic people, people who couldn't smell and see what different irritants bothered them and didn't, to try to figure how much irritation was due to -- upper airway irritation was due to the sense of smell versus the senses of taste and mouth feel.

Q. And his name again was?

A. James Walker.

Q. Dr. Walker?

A. Uh-huh.

Q. Did Dr. Walker ever test the sensitivity of that nerve to nicotine?

A. Yes. Yes, he did in certain organic acids to compare them against because organic acids are known to be irritants. He used the allergy test to do it as well. Our toxicologists helped him set up allergy

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tests in mice so they could tell how they were ranked as to irritation and then he could bridge that over to his pigeon work and to his work in people, when he asked different people what was irritating and not.

There was a program to try to figure out what components of secondhand smoke or environmental tobacco smoke people find irritating -- nonsmokers. So he had a series of studies to try to determine which parts of tobacco smoke are the most irritating to nonsmokers.

Q. And that was the reason why he studied the nerve sensitivity to nicotine?

A. That's the main reason. I don't know if there are any other, but that was the reason I knew of. He didn't work for he. I just had to make sure that the animals were well cared for and properly housed and fed. So that was the only relationship I had to it at that time.

In fact, he doesn't do that work today. He works on olfactometers today and people in general, not anosmics. He invented an olfactometer that people in research of senses of smell are trying to buy from us now. He patented it and they are trying to buy it.

Q. Does nicotine alone transfer intact in

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cigarette smoke?

A. Nicotine alone transfer -- it's -- in cigarette smoke, well over 90 or 95 of the nicotine comes across on the particle. I'm told on the outside of the particle, on the surface of the particle. Smoke particles are less than one micron in size. A smoke particle has nonvolatile compounds, carbonaceous compounds. And frequently on the surface has semivolatiles.

Nicotine is a semivolatile. It comes across in particulate phase, but it can be stripped off the particle and go to another compartment like air or across membrane like alveoli or in the oral cavity in the case of a pipe or cigar smoker. That's the hypothesis that seems reasonable. Again, it's hard to prove any of that because how do you -- how can you prove it?

Q. What is Project XB?

A. That was that levulinic acid project that you asked me about earlier. It was satisfying ultra low tar. Trying to respond to public health officials in Europe especially England, but not exclusive to England. And some people here thought that was the way to go, like Gio Gori.

Q. What substances did the Rothman Specials

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use in their processing?
A. I have no idea. Don't know.
Q. Was it ever studied?
A. We just smoked it and found out how repulsive it was and that was it.
Q. Did it have a tar to nicotine ratio of less than 10 to one?
A. Yes, according to Sam Simmons, who brought it to my attention.
Q. But you don't know how that was achieved?
A. No, I don't know how it was achieved. You could take the nic numbers and the tar numbers and figure that out, but I don't know how it was achieved. You know, if that thing, Sherrice, had been real good tasting, we would have figured out how they did it. But --
Q. KDN is de-nicotinized tobacco?
A. That's right. And we looked to see if it could be of any use in XB.
Q. Was it?
A. Well, it was a tool, but XB didn't work out. We later -- in Project XB, we found sugar tobacco reactions to be much better at that. So Winston Select, not the E.W. one, but the other one that used that.

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MS. KNISELY: (Indicating.)

A. So XB came up with some tools for taste that were better than anything like a levulinic acid or ammoniation of G-7 or anything else. Sugar tobacco reactions were the best way to get a lower tar cigarette that people liked. The sugar could be fructose or sucrose.

MS. KNISELY: What I would like to go ahead and mark as the exhibit next in line is a copy of an index of RDMs that was produced by Dr. Rodgman to us. Starts in 1954 up through, I believe, 1990.

THE COURT REPORTER: That will be Exhibit 9.

(PLAINTIFF'S EXHIBIT 9 MARKED FOR IDENTIFICATION.)

Q. Have you ever seen that list before?

A. No, sure haven't.

Q. Do you know who created it?

A. I thought you -- well, maybe I misunderstood you. I thought you said Dr. Rodgman did.

Q. Dr. Rodgman produced it.

A. Oh, but he didn't create it. Okay. I would imagine the library did. Helen Chung or some of her staff. Bunch of them, aren't there?

MS. KNISELY: Give me one second. I seem to have misplaced certain things. There you go.

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THE WITNESS: Me?

MS. KNISELY: Here we go. My apologies.

THE WITNESS: I didn't do nothing. I didn't do anything.

MS. KNISELY: Didn't touch anything.

THE WITNESS: Just this, and only after she put a label on it.

BY MS. KNISELY:

Q. Was levulinic acid ever tested with regard to its effects on nicotine receptors?

A. I don't know. I don't know if it was or it wasn't.

Q. Would --

A. You mean like Pat Lippiello's model?

Q. Yes.

A. It could have been, but I don't know.

Q. Would that have been necessary for evaluation as part of Project XB?

A. No, I don't believe it would have been -- no, it wouldn't have been necessary at all. If Pat Lippiello heard about the program, he might have gone to Watt Dufour and asked him for some to see if it would be of use at looking at protenated and nonprotenated nicotine on receptors. I mean that's a possibility, but I don't know that that ever

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happened.

The nicotine receptor program, especially before the nineties, would have been interested in different forms of nicotine and what receptors were -- you know, what were activated and what were not.

MS. KNISELY: Have you got that?

THE VIDEOGRAPHER: (Indicating.)

BY MS. KNISELY:

Q. Would it surprise you then that in 1989, Pat Lippiello was studying the enhancement of nicotine binding to nicotinic receptors by nicotine levulinate and levulinic acid?

A. Well, no, based on what I just said. If he had heard about it, he might have asked for some.

Q. But that testing itself was not part of Project XB?

A. I don't -- I don't think so. I mean I had Project XB from 1990 on, so it really -- I mean Project XB didn't exist until 1990 so it couldn't have been. So if he was aware of work that was done for taste of organic acids prior to 1990, he probably would have gotten some from somebody like Tom Perfetti or whoever and tested it. Sounds like he did.

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Q. You said that Project XB, the levulinic acid, ended late '91, early '92 to your recollection?

A. Uh-huh.

Q. Were there any other chemicals?

A. Well, let me make sure I'm 100 percent precise. We kept going with Project XB after that, but it was satisfied -- satisfying ultra low tar. It ceased to be called XB anymore, but it was the same stuff. And we looked at it from about -- oh, late '91, early '92 on. Using sugars and sugar tobacco protein reactions like I mentioned and it got away from levulinic acid.

Q. When you say you looked at the same stuff, what -- what did you mean be that?

A. Trying to have a maintained nicotine, low-tar cigarette that would respond to what the European public health community said ought to be done.

Q. Was part of that testing with regard to the substance L-arginine?

A. Yes, that was one of the things they looked at. For -- that's an amino acid which is, you know, part of the protein of tobacco, any plant, protein. Arginine, asparagine -- there were others they looked at.

Q. And what did they look at L-arginine for?

A. To see if it would form a sugar reaction, sugar

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amino reactions. If it would form a taste such that you could have a maintained nicotine, low-tar cigarette. There was also speculation that some of our competitors might use sugar amino acid reactions for good taste.

Q. What testing was done with regard to L-arginine in terms of its effect on nicotine yields?

A. I don't know. There may have -- well have been some, but I don't remember what they were. I'm familiar with sugar arginine reactions being used to see if smokers liked the taste of the cigarettes. Sam Simmons and Bill Casey did that.

Q. Did L-arginine to your knowledge affect the nicotine yields at all?

A. Not that I know of, but I don't know.

Q. How was it that levulinic acid was thought that it could maintain the nicotine level while lowering the tar? What was it about that substance?

A. Well, a lot of the harshness of nicotine might be eliminated. This is why it's counter-intuitive to the accusations made against the industry -- or at least against Reynolds, if no one else.

If levulinic acid combines with nicotine to form nicotine levulinate, then it's not going to be

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free. It's going to be tied up as a salt. So the deal was if you have extra nicotine there due to high blend, levulinic acid might tie up some of it so that it doesn't taste harsh.

Q. Did it affect the pH?

A. I don't think so. I mean some people looked at that, but I don't think it did anything to it. You have to have a lot of ammonia or a lot of salts or a lot of organic acid to move pH of smoke very much. I mean I forget what that article said on ammonia, but it was an unbelievable amount of ammonia that was required to move the pH of smoke up into the eight range like he reported.

Q. Did L-arginine affect the pH level?

A. I don't know. I don't even know if that was looked at. We were after taste. We were not after pH targets. So I haven't a clue what it did. I couldn't have cared less. I don't think pH is important unless you get out of the six range and then it becomes important because it tastes bad.

Q. Did you care what it did? What L-arginine did to nicotine yields?

A. Well, obviously if it worked out that it tasted good, I'd want to make sure I knew what it did to nicotine yield and what it did to pH in case we were

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accused of using it for that reason. But since it didn't work out, the arginine-nicotine stuff, it didn't really matter.

Q. The L-arginine didn't work out?

A. No. What that culminated in, that set of work was a technical discovery that we made for taste. We found that if you looked at the burley tobacco itself and you cased it in sugar such that -- it could be sucrose or fructose -- such that the ratio of sugar to nicotine is 3.2 to one in favor of sugar, that's your best tasting approach for satisfying ultra low tar.

We used that casing on burley for Winston Select, which has no higher yield than other cigarettes in its category, but tasted good to competitive smokers because it was more pleasing. They found it smoother, but not too smooth. They found it just harsh enough to be acceptable.

We later felt like we had moved and improved the taste of -- for those light products as far as we could with sugars. And we started looking at the gentle, moist heating of burley to get increased or better taste. We found that we had a tendency to over-dry our burley during the blending process such that it tasted too dry, stale and harsh.

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So we then began looking at an addition of sugar casings. The heating of burley with more moist environments might -- you know, humidity that wasn't too low. And we found it improved the taste of our products.

MS. KNISELY: I would like to mark as -- I guess Exhibit 10, the next document.

(PLAINTIFFS' EXHIBIT 10 MARKED FOR IDENTIFICATION.)

Q. Can you tell me that it -- what you have in front of you is Exhibit 10; is that correct?

A. Yes, it is.

Q. And is that a memo from an A. Gonzalez and a T. W. Stafford?

A. Yes. Al Gonzalez and Teddy Stafford.

Q. They are part of advanced technology products in R & D as of 1993?

A. Yeah. They were in new technology products, which is now called new cigarette technology.

Q. And the date of that memo is December 15 --

A. 1993.

Q. -- 1993?

A. Yes, it is.

Q. Would you turn to page two, please? Is that report signed by A. Gonzalez and T. W. Stafford?

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A. Yeah, and by myself.

Q. By yourself as having reviewed the document?

A. Yes.

Q. What was your relationship at that point with Gonzalez and Stafford? Were you their boss?

A. I was their boss's boss. Jerry Lawson was their boss.

Q. So you reviewed this document on or about December 15, 1993?

A. Uh-huh.

Q. Somewhere around that time?

A. That's correct.

Q. Can you tell me what the title of that document is?

A. "Addition of L-arginine to Reconstituted Tobacco Cast Sheet (RTCS) Substrate and Its Effects in GTC Cigarettes."

Q. What is GTC cigarettes?

A. Eclipse. It's not the Project XB.

Q. And can you tell me what the first objective is?

A. To determine the effects of adding L-arginine to the reconstituted tobacco cast sheet on nicotine yields.

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Q. And the next objective?
A. To determine the effect of method of application of L-arginine to RTCS either as top-dressing or prior to sheet formation.
Q. And the third objective?
A. To determine the effect of addition of L-arginine to RTCS on puff-by-puff nicotine yields and smoke pH.
Q. And the first paragraph of the summary?
A. "The addition of L-arginine to increase the pH of this substrate, RTCS, and thus aid in releasing the nicotine present in the tobacco utilized to make RTCS was accomplished. Two methods of application were evaluated: First as top-dressing and second prior to sheet formation. The top-dressing method was found to be the most effective in increasing nicotine yields.
Q. So L-arginine was studied with regard to nicotine -- the increase in nicotine yields; is that correct?
A. In this project it was. In the Eclipse cigarette prototypes.
Q. Was it ever studied in any other project?
A. Not that I know of. I could have been, but --
Q. Is L-arginine used in Eclipse?

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A. No.

Q. Was it ever used in Eclipse?

A. For these prototypes to look at. If it's used, I don't know it. It's a possibility that it's in there and I'm not aware of it.

Q. Can you turn to the third page?

A. Yes.

Q. Under results and conclusions, and read that paragraph for me?

A. "The addition of L-arginine to RTCS via top-dressing increased substrate pH." That's pH of the tobacco.

Q. Uh-huh.

A. "From six-one to six-six. This pH increase had an effect on nicotine yields as shown on Graph No. 1. The higher pH resulted in higher yields." Do you want me to keep reading on the next page?

Q. No, that's fine. Doctor, before we took a break, we were talking about high nicotine extruded tobacco. If we can go back to that subject, if you don't mind?

A. Okay.

Q. I believe you testified that you were not aware of any testing that had been done by Reynolds on high nicotine extruded tobaccos?

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A. Yeah, it could have happened, but I can't remember it or don't know about it.

Q. And you don't know why if Reynolds was studying it, why Reynolds would have been studying it?

A. Well, we looked at extruded tobaccos to replace reconstituted sheet. And we've looked at extruded tobacco and rice starch material to replace whole tobacco. I don't know why a high nicotine extruded tobacco would have been looked at, if it was.

Q. How would one make a high nicotine extruded tobacco?

A. I would imagine you would use burley, a higher -- might be low stalk position burley. You take a certain stalk position burley leaf is how I -- if I wanted to do that, how I would do it. And take the lamina and make a slurry out of it and put it with some sort of pectin and water paste -- with water and pectin and extrude it through a high-pressure orifice is how I would attempt to do it if I wanted to do it.

Q. But Reynolds doesn't make such a product?

A. I don't know -- I don't think so. I don't know of it. I mentioned Lila O'Connor. She was looking at some extruded tobaccos in the early nineties. I

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don't recall any of it was high in nicotine.

Q. What effect would high nicotine -- the placement of high nicotine extruded tobacco have on nicotine yields or the absorption or transfer of nicotine? In other words, the placement of the high nicotine extruded tobacco in the tobacco column itself?

A. How would it affect --

Q. Nicotine yields, nicotine absorption, nicotine transfer.

A. Well, theoretically it would increase nicotine yields. It could run the danger -- depending on what other tobaccos you had there -- of getting you outside that window and being called too harsh. But certainly it has the potential to increase the smoke yield of nicotine.

Q. And thereby increase the absorption and transfer?

A. Theoretically it could increase the absorption. The transfer across the biological membrane, don't know what it would do to that. But --

Q. Would there --

A. That's the theory.

Q. Other than increasing nicotine yields or increasing the absorption of nicotine, what other

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reason might there be for studying --

A. Extruded high nicotine?

Q. -- extruded high nicotine tobacco and the positioning of that in the tobacco column?

A. Well, the other program of tobacco extrusion I mentioned, using like rice starch or some other grain carbohydrate, theoretically you could use a higher nicotine-containing extruded tobacco to blend with that starch material to offset the absence of tobacco protein, tobacco oil and waxes. In other words, you could make a sheet that has less protein, oils and waxes; therefore, less bad compounds.

Q. But that -- that wouldn't have anything to do with studying the location of the high nicotine extruded tobacco in the tobacco column itself?

A. Yeah, you would blend it with a starch powder and make a powdered sheet out of it and then extrude it through an extruder and a water emulsion. So what would happen with that high nicotine sheet, it would be diluted with no nicotine material -- rice starch.

Q. But it would be diluted uniformly?

A. Should be if you mixed it right, yes.

Q. Would there be any benefit in terms of that process -- rice starch process by studying the location, separating out the high nicotine yield or

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extracted tobacco and putting it either in the center or the periphery of the tobacco column?

A. You might -- you might want to try to figure out how to blend and extrude it where it's separated. If you wanted to have a cigarette that the tobacco mount was smaller and was in the center and burned down the center and the stuff around the outside like a rice starch would burn, but it would burn with less -- it would create more ash than it would smoke. So if you wanted to look at co-extrusion, I think is what you would call that, such that the center is tobacco and the outside is not, it might offer one way to try to make an Eclipse or a Premier in a cigarette that burns down. That's a possibility.

Q. Do you know if that was ever tested? That process you just described tested by Reynolds?

A. I don't know if that was or wasn't. I sure don't. I remember some of our product developers talking about using either calcine carbon or other nontobacco material in that way to see if they could decrease the biological activity and the chemistry of tobacco. But whether they tried that with extrusion and did some chemistry on it, I don't know.

Q. Who would have been the developers if that was done? The process about the rice starch

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that you said, who would have been the developers?

A. In December of '93 --

Q. No, no.

A. Oh.

Q. Eighty-eight.

A. Allen Norman might have gotten involved. I don't know.

Q. What department would have had responsibility?

A. In '88, it might have been the material science department under Mary Stowe. That's, you know, a strong possibility. And Lila O'Connor worked for her about that time. I believe Allen Norman worked for her about that time. And they would have been with the group. They might have asked Harvey Young, who's a retiree to help. If they -- you know, this is speculation, of course.

Q. Sure. Well --

A. And I don't know what was going on.

Q. What department was Tom Perfetti in?

A. That same group. That same group. He probably would have been involved if such a thing was going on. I do recall the theory of if you could co-extrude tobacco and nontobacco, you might be able to produce a cigarette that burns down with a

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decreased chemistry and decreased biological activity of Eclipse.

The other group that was working on that goal -- not extrusion, but that goal -- was the Beta 90 group in '88, '89. They were trying to look at inert fillers, nontobacco fillers like calcine carbon. Like starch and other things to blend with tobacco to see if they could get the chemistry and the toxicity of tobacco down. They and Mary Stowe's group could have been trying to look at something like that together. Very possible. I just wasn't aware of it.

Q. You worked on Eclipse, did you not?

A. Yes, sure did.

Q. From what time did you work on Eclipse?

A. Well, from its earliest existence. When I took over advanced technology products in 1990, they were looking at the Premier chassis or design with the capsule and the tobacco suspension sprayed lumina beads and the carbon heat source. It had a tobacco column on the outside. They were looking at how to change and get rid of the capsule. But it was still in a Premier-like design.

I went to Bob DiMarco and Dave Isbister with some ideas from Jerry Lawson and his group and we got

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rid of the capsule, the machinery to make that part of Premier. We surplussed it and we went off at looking at sheets and paper plugs with glycerol in them, that kind of thing to see if we could create Premier's technology without the capsule and the granules.

Q. My question is, since you were part of Eclipse from the beginning, if there was development and the study of the high nicotine extruded tobacco and the location of that within the tobacco column with regard to Eclipse, you would have been informed about it, I would assume?

A. I would assume. They tended to look more at cast sheet than extruded tobacco.

Q. And you never heard of any such testing with the Eclipse?

A. I heard of the ideas -- "Could we use extruded tobacco behind the heat source?"

Q. But not high nicotine extruded tobacco?

A. I didn't hear about any high nicotine, no. I remember -- you know, that memo that I signed here, I remember them asking me could they look at amino acids in the substrate to see if it will throw off more tastes including nicotine. I said, "Yeah, you can look at it and see what it tells you.

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My best recollection is, is that nice as it seemed to perform, it didn't taste good enough. I don't know, but I believe we don't have any arginine in Eclipse -- L-arginine.

Q. I believe your testimony has been -- and correct me if I'm wrong -- RJR does not do anything to control the nicotine in its cigarettes?

MR. BELASIC: Objection.

Q. Correct?

MR. BELASIC: This is the question for about what? The 20th time?

MS. KNISELY: No, no, no. I'm just confirming that for my next point. That's all I'm doing.

MR. BELASIC: Well, then it definitely and perhaps intentionally misstates his testimony. We went over it in exhaustive detail with Mr. Maistros. That's not what his testimony was.

Q. To the extent -- then let me rephrase it. Only controls it to the extent that RJR controls tar and if nicotine follows, nicotine follows. But the focus is on tar. Correct?

A. That's right.

Q. If that is the case, is there any reason why RJR could be studying nicotine manipulation by

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injection of nicotine free base into the unlit tobacco rod?

MR. BELASIC: Object to the -- I object to both the argumentative part of the question and to the call for speculation.

A. If you injected free base nicotine in the rod, it would leave it and go into the air. Because it's volatile, it's vapor phase.

Q. Would there be any reason that RJR would be studying that?

MR. BELASIC: Objection. It calls for speculation.

Q. If you know?

A. The only reason is the ones I've shared with you the last two days. The early work I heard about in the eighties when you take high levels of ammonia and ammonium salts like members of the industry were alleged to be doing and you hit tobacco with it, you're going to increase the pH of the smoke and make the cigarette taste a lot like a cigar. In the case of extruded sheet, is that --

Q. No, no, no, no. This has nothing to do with the high nicotine extruded sheet. This is a completely different --

A. Okay. What is the question again, please?

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Q. The question is -- and maybe I can refer you. If you go through Exhibit -- that big index in front of you, which I believe is Exhibit 9?

A. Uh-huh.

Q. And look for the date issued in the right-hand column. It's on a handwritten page and it is in chronological order -- July 8, '86. You'll see a report there entitled, "Sensory Reaction to Sidestream Smoke Nicotine As Manipulated By Injection of Nicotine Free Base Into the Unlit Tobacco Road. And I believe that was done by D. Kurtz, Tom Perfetti, G. Ryan, D. Aker, L. Endy and P. Perfetti and F. Conrad listed under authors. It's listed as No. 108 in the 1986 listings. Let me get the '86s here. He was showing me his.

(WITNESS REVIEWS DOCUMENT.)

A. Now, what was the date in '86 again, please?

Q. July 8, '86?

A. July 8. Hold on one moment. I'm getting close. There it is. Sensory -- yeah, okay.

Q. So the question is if -- if Reynolds is not directly attempting to control the nicotine and only affects the tar which nicotine may follow, why would they be manipulating nicotine by injecting nicotine free base into an unlit tobacco rod?

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MR. BELASIC: I object to the question. You haven't established a foundation that he knows that.

MS. KNISELY: If he knows.

MR. BELASIC: That he has special knowledge or that he even read this report.

Q. If you know.

A. I didn't know anything about this. And it looks like what they were doing here is taking the nicotine free base, to use their words, and seeing what it does to sensory reaction or irritation of sidestream smoke. Appears to be why they're doing it.

Q. Appears to be the title?

A. Well, that's the title. "Sensory Reaction."

Q. Yes.

A. Yes.

Q. Yes.

A. That doesn't mean they intended to use it in a commercial product.

Q. Well --

A. They were just looking to see what it does to irritation of sidestream smoke.

Q. Where do you see the word "irritation"?

A. That's sensory reactions.

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Q. Ah. Is sensory reactions also not relaxation? What -- strike that. Go into --

A. No, sensory reaction is not relaxation.

Q. What are --

A. It's taste and smell.

Q. I'm sorry. Sensory reactions are?

A. Trigeminal nerve which has nothing to do with relaxation. Sensory stimulation can be smell, mouth feel, taste and things that are referred to as irritation of upper airways, trigeminal nerve reactions. And that's apparently what they were looking at here. Relaxation or stimulation like a cup of coffee in the morning is not a sensory response.

Q. What kind of a response is it?

A. It's an autonomic nervous system response. It's back to that paradox, nicotine and adrenocorticoids like -- mineralocorticoids like norepinephrine and epinephrine.

Q. That's a --

A. It can relax in one system and it can stimulate in another.

Q. That's a physiological reaction?

A. Yeah. It's a neuro -- it's an autonomic nervous system reaction physiologically. This here

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is about irritation of some sort.

Q. The tobacco rod is what? The cigarette? It's a way of saying cigarette?

A. Yes. It's the tobacco inside the paper, tobacco rod.

Q. So for lay people, it's the cigarette?

A. It's the tobacco part of the cigarette, yeah. So apparently, it looks like they injected some nicotine into that rod and looked at the sensory reaction to it.

Q. We were talking a little bit back about biosynthetic nicotine. And I believe you said that you -- to your knowledge, Reynolds had never tested it or had never made such a substance. And there would be no purpose for it with regard to cigarettes. Is that a fair statement?

MR. BELASIC: I object to the -- I object to your misstatement of the witness's testimony.

MS. KNISELY: He can tell me if I -- that's my question.

THE WITNESS: I'm at a loss to exactly understand your question. Could you repeat it, please?

BY MS. KNISELY:

Q. Absolutely. Biosynthetic nicotine -- we

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had discussed it before we took a break. And I believe you said -- and do, please, correct me if I misstate this.

A. Uh-huh.

Q. That Reynolds has never tested biosynthetic nicotine and that Reynolds has never made biosynthetic nicotine?

A. To my knowledge, they have not. It was within my frame of knowledge. Now, there is synthetic nicotine you can buy from chemical supply houses. One of the authors of this RDM you referred to, I believe in the context of that work that I discussed in the early eighties looked at high levels of ammonia and other things to see what you would have to do to increase, quote, "free nicotine." And for part of that work, I asked him one time, "Do you ever use synthetic nicotine?"

He said, "One time while I was waiting on getting tobacco materials, I used synthetic nicotine that you would buy from bioscientific -- anybody can buy it. Synthetic, not biosynthetic. And put it on tobacco leaf in a hood to see if all these allegations about free nicotine and changing pH were true."

Q. And who did that?

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A. Tom Perfetti. And it was not for product development. It was to try to understand some of the allegations against our competitors, not us.

Q. Do you know of any other use that Reynolds had for testing of biosynthetic or synthetic nicotine?

A. I'm sure that they have looked in the chemical lab before at synthetic nicotine, but I don't know. It's something that would precede me and I wouldn't know anything about.

We put in some standards on nicotine in the department -- "we" being the toxicologists that came here. That the most concentrated nicotine ought to ever be from tobacco is eight percent. So synthetic chemistry that you -- synthetic nicotine, excuse me -- that you buy from a chemistry, if there was any scientists who were going to use it since we came in '84, they had to make sure it was no more concentrated than eight percent.

Q. Who is Denise Blume?

A. I don't know her. I've heard the name, but I don't know her.

Q. Henry Chang?

A. Henry Chung?

Q. Chung, I'm sorry.

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A. Henry Chung is a chemist that works at R. J. Reynolds. He's the husband of the librarian, Helen Chung.

Q. And what -- in 1985, if you know, what part of Reynolds was he an employee of?

A. He was in, I believe, Alan Rodgman's group.

Q. Which was?

A. Well, it was the chemical research group. Tobacco chemistry or something it was called.

Q. Would there be any reason why --

A. And he worked for a Giles, a Jay Giles, I believe.

Q. Would there be any reason why he'd be studying biosynthetic nicotine?

MR. BELASIC: Objection. Calls for speculation.

MS. KNISELY: If -- I'm asking if the witness knows.

A. I don't know. I don't know what reason he would have been. I'm curious where one can get nicotine other than from tobacco and call it biosynthesized. That intrigues me.

Q. Well, can I refer you to -- if you look in that index, number nine. I believe March 20, '85 in the RDM '85 listing?

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A. Uh-huh.

Q. There is a listing there for Denise Blume and Henry Chung entitled, "Identification and Quantification of Nicotine Biosynthetic Intermediate In Tobacco."

A. In tobacco?

Q. In tobacco.

A. In tobacco. So that would mean there's biological pathways in the tobacco leaf that they were studying. March what, please.

Q. March 20, '85.

A. Yeah. "Identification and Quantification of Nicotine Biosynthetic Intermediates In Tobacco."

Q. In tobacco.

A. That's tobacco nicotine. I mean that's --

Q. Biosynthetic?

A. That means the biological processes of the tobacco leaf and its metabolism and its pathways, biochemical pathways have intermediates that they were studying. That doesn't mean you've got an oyster, clam or an E. coli to make nicotine for you and then put it in the tobacco. That's what I would say this means.

And they were probably looking for -- because in the eighties, they were interested in what was --

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what is the whole family of metabolites of nicotine, once and for all. They were trying to figure out every alkaloid in the nicotine family in the leaf -- in the green leaf and in the cured leaf. Because there was a lot of debate and hearsay out there about what was and wasn't present. So I was aware of in the mid eighties the chemists group trying to figure out how much of each nicotinic compound was in the pathway of nicotine in the leaf before and after nicotine?

And they were fussing about this guy -- wait a minute. Some guy at USDA had a pathway that left some things out and had some things in there that were small players. Henry Tso, T-s-o I believe his name was. He's a -- he's a great chemist at USDA, but even he didn't have all the -- in our chemists' minds, all the metabolites. So they're going, "Well, what are they? In the biosynthetic pathway of nicotine, what are all the compounds?" So they were trying to identify them.

Q. And my --

A. And I remember him talking about that.

Q. I'm sorry. I didn't mean to cut you off.

A. That's fine. I was through.

Q. Am I correct in my recollection -- and

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please, again, correct me if I'm wrong -- that RJR never sprayed nicotine on its tobacco?

A. For commercial use, no, I don't believe they ever did. For -- for lab use, that incident that Tom Perfetti referred to me, that I just articulated probably is an instance where they did in the lab in a chemical hood. I don't know of any other times they may have done that.

Q. Would they have sprayed water extract from the KDN process onto tobacco?

A. They could have. XB, we looked at that as a possibility. Not for commercial cigarettes, but for experimental cigarettes.

Q. So their --

A. Water suspensions from burley, even the KDN process certainly were used to see if we could get low TN cigarettes.

Q. Where they also looked at nicotine in the spray-dried tobacco extract?

A. Could have. Yeah, could have.

Q. Towards what end?

MR. BELASIC: Objection.

A. To make sure --

MR. BELASIC: Objection. Calls for speculation. If you've got personal knowledge, tell

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it.

THE WITNESS: I don't know if this is the same thing as what you're asking, but they knew I wanted whatever they looked at in spray-dried tobacco from burley or any other place not to exceed eight percent nicotine. So they would have wanted to know how much nicotine was in such an extract so they wouldn't violate my rule --

Q. In terms of --

A. -- that I put on them. I don't want anybody a ound nicotine at higher than eight percent.

Q. And that's for the lab? There was never ny spray-dried nicotine extract put on any commercial tobacco?

A. Not on commercial tobacco. We certainly looked at it in XB development, but they had to know how uch nicotine was in it or they'd get in trouble with e because I didn't want it over eight percent.

Q. And they only looked at it, to your knowledge, for the XB project?

A. Well, certainly for the XB project. Certainly for Premier on those lumina beads. That was a tobacco suspension. I'm sure they didn't care how much nicotine was there, but they wanted to make sure it wasn't over eight percent in any part of that

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process. Because you know, you can make people sick around concentrated nicotine solutions.

Q. Sure.

A. So we don't want to do that.

Q. Isn't nicotine a toxin or poison?

A. Can be. If it's too highly concentrated, it certainly can be.

Q. Premier was started when?

A. Well, the earliest prototypes of Premier where glycerol was looked at as an aerosol agent dates back to the 1881 [sic], '83 era.

Q. I'm talking more with regard to looking at extract, the nicotine extract.

A. The spray-dried nicotine?

Q. Spray -- yes.

A. Nicotine -- now you've got me doing it. The spray-dried tobacco that's put on lumina beads. That probably was '86, '87, somewhere in that vintage. I don't know. I'm guessing because -- no, let me -- I mean eighty -- let me think. I came in '84. I began to know Premier and its technology. It could have been '83 -- '82, '83 that they first started looking at that. Probably was.

Q. Have you ever heard of the proceedings of the 1989 Inter R & D nicotine symposium?

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A. Yes, sure have. I attended part of it.

Q. You did?

A. Uh-huh.

Q. Can you tell me is there something about those proceedings that would one would call secret?

A. No. They were part of that program that John Reynolds' group had to understand nicotine. And that program had outside researchers funded. And at that particular meeting that you're talking about was intra R & D. That probably was the inside investigators -- Reynolds, Pritchard, Lippiello, maybe Robinson, Gilbert. They probably were getting their act together on the work they had done to share with the outside researchers who were doing nicotine research.

Q. Is that why in that index if you look under August 22, 1990?

A. Okay.

Q. It's got Perfetti listed, Potter, Jakob, Robinson, Lawrence, Davis, Strausburg --

A. Hold on just a minute. Let me get to it, please.

Q. Sure.

A. I'm not very good at doing two things at once when I'm tired. Probably never am good at doing it.

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Now, what's the date in '90, please?

Q. It's actually '89 -- April 12, '89.

A. Okay. About -- I'm just about there.

MR. BELASIC: Oh, hold on -- April 12, '89.

MS. KNISELY: Yes. In the one column, I guess it was received August 22, '90. I'm sorry. I think I gave you both dates.

THE WITNESS: Okay. That --

Q. Do you see that as a number 99 and then next to it, it's got a big thing -- "secret" word written. "No copies unless authorized by Tom Perfetti."

A. Yeah.

Q. And it's got a whole long list. I think I left off at Gentry, Haberkern, Savoca, deBethizy, John Reynolds, Pat Lippiello, William Sam Simmons, Wally Pritchard, J. C. Walker?

A. I was left off. I'm hurt.

Q. I didn't see your name there.

A. Yeah, that's terrible.

Q. Isn't it?

A. Some of these nicotine symposiums I attended. Apparently I wasn't at this one.

Q. Would it have listed anybody else if

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there was an outside person?

A. Probably so.

Q. And these -- as you recognize them, they are all internal Reynolds employees?

A. Let me go through the -- Jakobs, yeah. Robinson -- Robby Davis -- [INAUDIBLE.]

THE COURT REPORTER: I can't hear.

THE WITNESS: Yeah, they are all inside. I'm sorry. I'm just reading them out loud to myself. They are all insiders.

Q. Was it common for inside proceedings to be considered top secret, no copies available unless authorized by Tom Perfetti?

MR. BELASIC: Objection. That's not what it says.

MS. KNISELY: I'm sorry. It says no copies unless authorized by Tom Perfetti.

MR. BELASIC: It doesn't say "top secret."

MS. KNISELY: I'm sorry. It does say "secret" in big bold letters. It doesn't say "top," but it does say "secret."

BY MS. KNISELY:

Q. Is that a common practice for such symposium in-house?

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A. No, that was the first time I've ever known any was called secret. Because these were usually in preparation, as I've already stated, with the outside recipients of nicotine research. Usually they would get together each year before they had these folks in and go over their own presentations.

Q. Uh-huh.

A. I don't know why this one was secret.

Q. In the date received column, it says August 22, '90. And then it has initials next to it -- I suppose as the person who received it. CDH -- do you know who those initials would stand for?

A. CDH? I don't off the top of my head. I can think a moment here.

Q. Could I suggest maybe Hoover?

A. Who?

Q. Hoover? Was he head of R & D before DiMarco?

A. DiMarco was head of R & D in the nineties. And I think Murray Senkas was before DiMarco. There was Roy Morris who had it for the interim who was Bob DiMarco's boss when he came in -- shoot, ten years back from '90. Bob DiMarco came in 1982, I believe.

Q. Maybe it was DiMarco's boss then. Do you remember a man named Hoover?

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A. Huh-uh. No, his boss was Hutnell Christopher and later, Dave Isbister.

Q. Okay. Dr. Rodgman had suggested that these indices may have been created by Mr. Hoover.

A. I don't know who Mr. Hoover is, so I yield to his opinion.

Q. Okay.

A. Maybe he was a librarian or something.

Q. Have you known of any other meetings like that that were ever kept secret?

A. No, I didn't know about this one either. They -- they didn't even include the boss of this group, Wally Hayes, it looks like. That's -- you know, that's pretty unusual. It's unusual to have a secret meeting like this, period. And not to have Wally there is unusual as well, in my opinion.

Q. There is seems to be a couple in this index as well that are marked "secret, Project NN." Do you know what Project NN was?

A. Yes, I do.

Q. And what was that?

A. If it's the one I'm thinking of, it's what later became NA, which is the project we had with the Japanese on Eclipse if it's the same one I'm thinking of.

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Q. Which came into -- which is Pianissimo now?

A. No, it's -- they have Eclipse in Japan. Their own Eclipse and their own design in manufacturing. It's called Airs, A-i-r-s. It's -- they cross-licensed the technology from us and made their own version of Eclipse with Japanese tobacco.

Q. Reynolds has nothing to do with the production of that? Just the licensing of the technology?

A. That's correct. We have nothing to do with it otherwise.

Q. What is LAN-10 process?

A. I don't know.

Q. Do you know what that might be?

A. I don't know what that is. LAN -- no.

Q. Oh, I'm sorry. LNA -- my apologies. LNA-10? Possibly something to do with Camel Light?

A. What page is that?

Q. There is one on May 8th of '89 and one, June 2nd of '89.

A. Gosh, it jumps around. There's May 10th and June 2nd. Maybe I had better look --

Q. May 8th of '89 and June 2nd of '89?

MR. BELASIC: Number 119.

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Q. Numbers 119 and 144.
A. Okay. I see 144.
MR. BELASIC: Actually you're looking at No. 119.
A. Uh-huh. Alice Liu is still with the company, I believe. So she'd have to answer that. I don't know what that's about.
Q. And I believe she also did No. 144.
A. Looks like she did, yeah. I don't know what LNA-10 is. I really don't. Camel Lights, VF -- I don't know what that is. See, I was in toxicology at that time so I wouldn't have been involved.
Q. Can you look at September '80 -- 7, '89?
A. September what?
Q. Seven. It's No. 249 in '89.
A. "Sensory Evaluation of DAP Extract." It's one of the G-7s --
Q. What is --
A. -- and reaction time.
Q. What is G-7AE?
A. I don't know. It's obviously a reconstituted sheet, but I don't know which one.
Q. Has ammonia in it?
A. Has DAP in it. I don't know how much.
Q. And how do you know that?

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A. Because it says DAP --

Q. DAP extract?

A. -- which is diammonium phosphate, yeah.

Q. Whenever it's listed G-7 with an "A" after it, is that ammoniated G-7?

A. I don't know. Not necessarily, but I don't know. Could be.

Q. Do you know what reaction time they're talking about?

A. Could be the time for it to set up or gel up, acting like pectin and sort of a glue. That may be what it is. It could be something else. I don't know what it is.

Q. Who is W. M. Coleman?

A. Bill Coleman is a chemist.

Q. Is he current -- is he a current employee?

A. Yes.

Q. And what department does he work in?

A. He works in Dave Townsend's product development and assessment area and he works for Bob Lloyd, I believe, in the research chemistry group.

Q. Do you know why in January of '90, he was studying the examination and refinement of the process conditions for the dense fluid manipulation

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of nicotine levels in tobacco and tobacco extracts?

A. What page is that? What number is that? I'm sorry.

Q. That's January 10, 1990.

A. Has that got a number on it or not?

Q. It does. It's No. 6 in 1990.

A. Okay. They start numbering these over again it looks like.

Q. I think they did for each year.

A. Okay, number six. I've got -- now that I've gotten over -- okay, here we go. They've got some '89 RDMs in eighty --

Q. Oh, they must have done that in the copying.

A. Yeah. Okay, number six.

Q. Do you know why W. M. Coleman was studying examination and refinements of process conditions for the dense fluid manipulation of nicotine levels in tobacco and tobacco extracts?

A. No, I don't. I was still over toxicology at that time, so I don't know what he was doing.

Q. You said you knew -- you knew of an Alice Liu, L-i-u?

A. Yes, I know of her. I don't know where she is now.

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Q. She's no longer a current employee of Reynolds?
A. I don't know.
Q. Do you --
A. I haven't seen her in a while so I don't know where she is.
Q. Do you know how long ago it was you last saw her?
A. Been a couple of years, but I don't recall. She used to work some in the brands area. I just assumed she had been transferred to another department, but I don't know where she is.
Q. Is she a doctor? Holds a Ph.D.?
A. I don't think so.
Q. Is there a such a thing as a nicotinized blend or reconstituted sheet?
A. I don't know of one. I'm sure there could be, but I don't know of one.
Q. What would be -- if there was one, what would be the purpose of studying it if not to control nicotine?
MR. BELASIC: Object to the form.
MS. KNISELY: If --
MR. BELASIC: It calls for speculation.
MS. KNISELY: If the witness knows.

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MR. BELASIC: He just said he doesn't know what it is. Then you ask him what would it be for. It's classic speculation.

THE WITNESS: I don't know what it would be for. I really don't.

BY MS. KNISELY:

Q. I think if I can refer you -- I don't know if this is helpful or not, but February 7 of 1990.

A. Does it have a number by that one?

Q. 31 of 1990. "Sensory Evaluation of the Nicotinized Whole Blend and Reconstituted Sheets -- Camel Lights 85VF."

A. I don't know what that is.

Q. Do you know --

A. Looks like it has -- Alice Liu worked in the SED area and has an SED number by it.

Q. Uh-huh.

A. And it calls -- says it's a sensory evaluation, so it's probably a taste and overall acceptability study of some Camel Light cigarette. And I don't know anything about it. I didn't go over to advanced technology products until June of 1990 and I wouldn't have had any interaction. I didn't even get invited to the SED parties very often because I wasn't on

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their panel because I'm a pipe smoker.

So I don't know what Alice was doing with -- and certainly for a while she worked with the SED panel. That's why I don't think she has a Ph.D. because they don't tend to be Ph.D.s, but I don't know where she is now. She could still be with the company. I just don't know. But in this case it's apparently some sort of SED panel evaluation of this material.

Q. Which is nicotinized whole blend?

A. That's what they call it, nicotinized whole blend.

Q. And reconstituted sheets?

A. Yeah, I don't know what that was for.

Q. Do you know how you would nicotinize a whole blend or reconstituted sheet?

A. I would imagine you would put more burley in it, but I don't know.

Q. Are there other ways to do it?

A. You could take spray-dried burley and put it in there. But they would almost always, in my opinion, have burley -- burley tobacco.

Q. Take nicotine extract and spray it on the burley?

A. Tobacco extract. There could be higher

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nicotine than the whole tobacco is. That's a possibility, but I don't know. I don't know that they're doing here. First I've ever seen it.

Q. De-nicotinized tobacco is removal of tobacco, correct?

A. Yes.

Q. Nicotinized tobacco then would be the addition of tobacco, would it not?

A. Possibly.

Q. What else would it be, if not the addition?

A. Could be the addition of tobacco with higher nicotine in it mixed with other tobacco. The de-nicotinize -- de-nic process of burley takes a lot of things out of tobacco, not just nicotine. So whatever is nicotinized could be nicotine, organic acids, water solubles -- which could be a water extract of tobacco.

Q. But --

A. But I certainly don't know what this nicotinized whole blend is.

Q. Are --

A. You ask me how I would do it. That's what I would look at.

Q. Are you saying, though, the nicotinized

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whole blend didn't contain an increased amount of nicotine?

MR. BELASIC: Object to the form.

A. I don't know what it's contained.

MR. BELASIC: Object to the form. It calls for speculation if you're talking about Title 31 on 2-7-90.

THE WITNESS: Yeah, I --

MR. BELASIC: Is that your question?

Q. That wasn't -- my question is, nicotinized whole blend does not contain additional nicotine? However it happens to get in there, it doesn't contain additional nicotine?

MR. BELASIC: Same objection.

A. It certainly could, but I don't know. I can't help you with this.

Q. Wouldn't common sense say that it would?

MR. BELASIC: Now, objection. Now it's argumentative. He answered the question.

Q. Do you know what G-710 extract processing was, or is?

A. I would have seen that on that list of Dan Pugh's, but I don't remember what it said. Do you remember the list I referred to earlier of G-7 codes?

Q. Right.

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A. That I saw in 1990? There is -- he kept a code at that time when he had PT&D.

Q. Were there more than one methods of extraction in terms of G-7?

A. Well, the only one I know of that we used commercially was the water bath process that I described earlier. Reynolds scientists could have looked at experimentally over the years other extraction processes of G-7. We had, as I described yesterday, lab scale rest process, which is some sort of high pressure extraction. We could have used that on G-7 you know, in the lab. It would have had to have been small amounts of G-7 to go through this apparatus, which can be shut down and high pressure put upon it.

In the laboratory, you can use ethanol extraction. You can use alcohol instead of water and pull different things out than you would with water. That would be very expensive to do over in Shed 181, plus it would be unacceptable from OSHA, the amount of alcohol you would have to have in there. It would cost you a fortune on taxes anyway, ethanol would. But also you'd have to be careful with the workers in that area. You could do that, however, in a little mock-up lab scale looking at reconstituted sheet, if

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you wanted to. I don't know of anybody doing it, but it's a possibility.

Q. Rather than the chemicals per se, the process itself -- are there different ways to do the process? Say, a continuous versus a batch extraction?

A. You can do a batch extraction if you want to. I don't know if anything was ever done like that.

Q. What is -- in the extraction process now, what is being done? Continuous or batch?

A. I imagine either way. I don't know. The 181 shed usually is running for manufacturable material. But there is always -- if you schedule ahead of time -- you can have them make up a special G-7 for product development reasons.

Q. I'm talking about commercial.

A. Commercial, it's -- as far as I know, that continued process.

Q. Continuous.

A. That's why we have two facilities. 181 can be used by R & D for special projects as well as it can be used for commercial activity.

Q. Have you ever heard neat? Of the word "neat," n-e-a-t?

A. Yes.

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Q. What is that?
A. It's any compound or material that's almost pure. If it's not pure, it might be like 70 to 90 percent of 80. It's not very diluted, for example.
Q. But it's used to describe various additives? It's not an additive itself?
A. It's usually an adjective. That's correct. It's usually neat flavors or neat nicotine -- I guess you could use it there. Neat cocoa, neat vanilla, neat sugar.
Q. Have you ever heard of a company, Reynolds Tobaccos Doe Brazil?
A. I heard about Reynolds activities in Brazil years ago.
Q. Does that company exist today?
A. I don't think so, but I'm not certain.
Q. Do you know does Reynolds have any research in Brazil?
A. Not that I'm aware of. We -- we have negotiations with a company down there who's interested in using a steam flotation process that we have called ESS for stems, to make stems bigger and expand it. That's the only thing I know of in Brazil we have going on right now. And that's just negotiations -- we don't have anything down there.

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Q. Did Reynolds ever grow tobacco in Brazil or develop tobacco in Brazil?

A. We may have bought tobacco from Brazil and we may have even had some down there many years ago to grow. I don't know. We have had some of our folks in R & D work in Brazil many, many years ago.

Q. Who would those people have been?

A. The only one I know of is Kenny Swicegood, who's retired from the company. He was a product developer who worked for me. He just said that he was on a project years ago down in Brazil making Winstons down there. I don't know why he was down there other than that.

Q. You said he's currently retired?

A. Yes.

Q. Do you know where he lives?

A. He lives near -- what is that place called? It starts with an "A." He's between -- he's about three miles north of Welcome, North Carolina which is about 20 miles southwest of here.

Q. Has Reynolds ever done any research in the Canary Islands?

A. I think we've had a production facility in the Canary Islands. I don't know that we've done any research there. I think we have a -- I think we have

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a commercial presence there in the Canary Islands.

Q. There's a current production facility presently there?

A. Could be. That would be part of Tobacco International. I think we sell cigarettes in the Canary Islands. We may even make them. I don't know.

Q. Does RJRT here have any -- any current business with the Canary Islands?

A. Not that I'm aware of.

Q. No research projects?

A. Not that I'm aware of. Now, Tobacco International could have a research project there.

MS. KNISELY: Can we take a five-minute break?

MR. BELASIC: Sure, yeah. No, we've been going a long time.

THE VIDEOGRAPHER: We're going off the record at 4:04 p.m..

(RECESS TAKEN FROM 4:04 P.M. TO 4:20

THE VIDEOGRAPHER: Back on the record at 4:20 p.m.

BY MS. KNISELY:

Q. Doctor, before we move into any other major new inquiry -- line of inquiry, I'd like to go

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back. I've gone through my notes to pull out some small things that had kind of been left out there for us to talk about, to kind of clean things up.

You had said yesterday, I believe, that you had talked with Dr. Townsend over the summer about -- discussed with him his deposition that he had this summer?

A. Just asking how it went.

Q. Do you know in what case he was deposed this summer?

A. There were several. I don't know which one it was. It could have been the Florida case, but I don't know. He works for me and I like to check on folks and see how they are doing. They have to do their regular job and these, and I just want to make sure they are doing okay.

Q. What is the Kentucky reference cigarette?

A. There is a bunch of them. Many years ago -- probably sixties, somewhere in there -- the University of Kentucky with the tobacco industry offered to be a resource for standard research cigarettes and have a category of cigarettes for each tar category using the American blend.

For example, 1R4F is the lights or light tar or low tar category cigarettes. And they are around

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eleven and a half to twelve and a half milligrams of tar, the 1R4F is. The 1R5F was like two milligrams of tar.

So it would be a research cigarette -- a reference cigarette for standard comparisons in the ultra low tar area. I think the full flavor is 2R1 or something like that.

Q. How many different Kentucky reference cigarette versions are there?

A. I don't know. There are at least five, but I don't know how many there are all together.

Q. *You mentioned Winston Naturals or we talked about Winston Naturals yesterday. Did Winston Naturals replace Winstons? Or are they Winston Naturals separate and apart --

A. All natural Winston -- all natural Winston has been in Florida for some time and now is rolling out gradually to a national scale. So it will gradually replace Winston if things go as planned. If we have a Coke/Classic Coke phenomena evolve, then we'll change our mind. If too many people get mad at us for not having the traditional Winston out there, we'll fall back and re-evaluate. But for now, it's going smoothly to national.*

THE VIDEOGRAPHER: Wait just a minute. I

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just lost power somewhere.

(DEPOSITION INTERRUPTED AT 4:23 P.M.)

(DISCUSSION OFF THE RECORD.)

THE VIDEOGRAPHER: This tape just ended abruptly and we're going back on this tape. A tape player malfunctioned. We're going to stop this tape and start a new tape right now. This is the end of tape six and we will go to a new tape, which will be tape seven. We're going off the record at 4:30 p.m..

(RECESS TAKEN FROM 4:30 P.M. TO 4:32 P.M.)

THE VIDEOGRAPHER: This is videotape seven of the videotaped deposition of Gary Burger, Ph.D.. We're going back on the record at 4:32 p.m..

MS. KNISELY: Can you read back the last question and answer just so we kind of all know where we were?

(*RECORD READ BACK.*)

BY MS. KNISELY:

Q. I'd like to move onto Eclipse and we've talked about it off and on, but in some detail if we can. Did RJR use any of its employees to test Eclipse?

A. We have an expert panel, which are R & D employees who are experts on taste of cigarettes.

Q. The SED panel we talked about?

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A. No, that was used as well. But most of the time prior to then, we have an expert panel test prototypes of Eclipse. And they are primarily within the new cigarette technology group.

Q. And what did that -- what type of testing that did that expert panel do?

A. They -- they typically set around a table like this and they have ballots. And they smoke prototypes and they give scores to it. They have a scale they fill out on how good it tastes, what kind of draw it has -- which is mouth -- and what kind of mouth feel, what kind of after-taste. How even or harmonious the puff-to-puff taste is. Those sort of things they fill out on this ballot.

Q. Was there any testing of any blood or urine tests or any type of health data of the expert panel taken?

A. No.

Q. You said that the Eclipse was also then tested by the sensory evaluation -- what does "D" stand for again? Sensory evaluation --

A. Sensory evaluation discrimination.

Q. -- discrimination panel. Did their testing consist of the same testing that the expert panel did, the sensory testing?

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A. Similar things. They get more into specific attributes like tobacco taste, overall performance, harshness, smoothness, sweet, bitter. They get into very specific attributes on the SED.

Q. Were there any blood or urine tests done on the SED panel participants --

A. No.

Q. -- who smoked Eclipse?

A. None at all.

Q. Was there any such data ever collected on anybody who smoked Eclipse?

A. On occasion we have taken panels and have them smoke a new prototype we intended and usually have gone to market with, trying to improve Eclipse. We look at their carboxyhemoglobin. They give a -- they also give a rating of how they like it. And we look at their nicotine blood level as well and/or their sputum.

On occasion sometimes they'll do a sputum for nicotine, saliva for nicotine. It's intended to respond to any criticisms we would get if we didn't check that. It's not a part of our products criteria, but health officials have asked in the past and we anticipate they always will when we have a new prototype of Eclipse what those values are.

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Q. And what prototypes have you done that with?

A. We've done it with two precursors or prototypes prior to Chattanooga test market. We did it on the Chattanooga test market and we've done it on two improved prototypes that I can recall.

Q. That's all to do with -- when you say the Chattanooga test market for Eclipse?

A. Yes.

Q. So it all has to do with the precursors and the modifications after the test marketing of Eclipse?

A. Prototypes prior to it --

Q. And subsequent?

A. -- and those that we have that are improvements to it.

Q. What improvements were there to Eclipse after the test marketing in Chattanooga?

A. It was even in this morning's paper, but we improved the taste and the lightability of Eclipse. The Winston Journal this morning had an article about the next test market and product.

Q. How did you improve the taste?

A. By the kind of tobacco that we used in Eclipse.

Q. And then how --

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A. We also put a different kind of filter on it.

Q. Let's deal with those one at a time. In term of the kind of tobacco used, how did you change the tobacco?

A. We just changed the blend especially in the tobacco right behind the heat source. We wanted it to have more -- both more burley and more flue-cured.

Q. And what effect did that have on the taste?

A. They tell -- the consumers, the expert panel the SED and a limited consumer test we did in Chattanooga and one in Florida told us it tasted better.

Q. Did this improvement have any effect on the nicotine level or nicotine yield?

A. Didn't appear to, no. Well, I mean -- depends upon which prototype you compare it to. It's both stronger tasting than Chattanooga has on FTC, the same nicotine.

Q. Had the same nicotine effect?

A. On FTC -- FTC smoke yields are both around 0.2.

Q. What was the nicotine yield of the Chattanooga test market?

A. Around 0.2. Somewhere around -- 0.15 to 0.2. There were two of them, lights and full flavor.

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Q. And the 0.2 was the full flavor?
A. Uh-huh.
Q. And 0.15 was the lights?
A. Uh-huh.
Q. What were the nicotine yields on the two improved prototypes or improvements after the Chattanooga market?
A. They are around 0.2. I don't know offhand exactly what they are.
Q. For the full flavors?
A. And maybe the lights as well. I don't remember, somewhere in that vicinity. They are a little more on the lights, I believe. Closer to 0.2 on the lights, but I don't have a good recall of the details.
Q. Did it have any effect on the tar levels?
A. I think they are about the same. I don't recall any changes. It was around three milligrams of tar and that tar is mostly glycerol and water.
Q. Burley and flue-cured tobacco --
A. Uh-huh.
Q. -- have naturally higher nicotine levels than Turkish tobacco, or not?
A. Flue-cured and Turkish may be very similar. Burley has higher nicotine levels naturally.

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Q. So by adding more burley and more flue-cured, that -- more burley and more flue-cured would have had more nicotine in the tobacco leaves, correct?

A. Correct.

Q. And adding more of those didn't increase the nicotine yield?

A. On FTC, as I stated, one of them is closer to 0.2 than it was before, to the best of my recollection.

Q. What's the nicotine yield in the full-flavored Eclipse on the market now?

A. Point two on FTC. We do other smoking profiles because our critics ask us to.

Q. Point two milligrams?

A. Point two milligrams of nicotine.

Q. Does it --

A. Which makes it very low.

Q. Does it refresh your recollection that it might be maybe 0.4 milligrams?

A. No, I don't remember that being the Chattanooga product. Point two is what I remember.

Q. Or what's on the market today?

A. Are you talking about tar or nicotine?

Q. Nicotine.

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A. The 0.2 is what I remember. But you know, I'm sitting here trying to recall all the prototype values, so I could be off. The one that we have now is about the same on FTC that we think is an improvement. Only 50-30, it moves up nicotine yield a little. Now, 50-30 is not something that you use for standard testing. It's what some of our critics say we should do, so we do both.

Q. The Eclipse cigarette, can you briefly describe for me the design of it?

A. Yes, it's -- we've published this. It's been in a lot of newspapers. But it has a clean carbon heat source wrapped in a filament that is glass mat that is comprised of glass that is uninhalable, cannot be inhaled and glass that -- filaments that fuse together when lit made in a mat form.

Also in that heat source is some powdered tobacco and a reconstituted tobacco sheet in that glass mat. Those are there because Premier was complained about on having light-up puffs not taste like tobacco so we put some tobacco up there. That tobacco when you add it all up is less than five percent of the tobacco that is burned in other cigarettes.

Behind that heat source and under aluminum foil

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is the junction between the carbon heat source and the first kind of processed tobacco. That's the tobacco I was referring to that we used more burley and other tobaccos in than we did previously. We use less stems and more lamina or leaf, especially burley leaf.

And then behind that is a blend, standard blend of tobacco, specially treated process-wise because you don't burn it. And then you have the filter. The filter now is more of a Vantage filter. It has hole in the middle, compared to the one in Chattanooga.

Q. That's how -- it's a different filter? That's the way it's a different filter?

A. Yes.

Q. And what is the purpose behind the hole in the center of the filter?

A. It allows more tobacco taste to come through and the main reason has always been on a filter -- whether it be Premier, Chattanooga prototype of Eclipse or the present one -- is for the smoker to hold in their mouth. It's never been the filter much because you don't -- when you heat tobacco, yield much to filter. So this one filters even less than the previous one. So it allows more tobacco taste.

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Q. Did it increase the tar level?
A. I don't think that it did. I think it's in the same vicinity, but I'm not sure. It could be slightly more, but I believe it's about the same.
Q. Now, when you said there are two different tobacco sources -- one has more burley in it and one is more standard tobacco -- are they in separate capsules?
A. They're not in capsules, but they are -- they are rolled in a way when the paper is wrapped around it, the front part is one kind of tobacco, what we call the tobacco substrate. The back part is another kind of tobacco, which we call the tobacco roll, TBR.
Q. Were there any -- other than changing the filter and changing the blend of the tobacco, were there any other changes between the Eclipse test marketed in Chattanooga --
A. Uh-huh.
Q. -- and those that are on the market --
A. Uh-huh.
Q. -- today?
A. Yes, we designed -- redesigned the whole configuration, the holes, the grooves in the heat source so that it lights easier and so that the cigarette produces less carbon monoxide. So if it

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lights easier and burns more efficiently you have less carbon monoxide and you have a cigarette that doesn't frustrate the smokers in trying to light it.

Q. Any other changes?

A. No. No, I'm sitting here thinking I don't know of any other changes. The improved taste comes mainly and almost exclusively from the formulation of tobacco, the blend of tobacco in the substrate behind the heat source. The improved lightability comes from those holes and we also tried to lower CO because our supporters and our critics said, "You should try to get the CO down," so we did. And it worked to do both, make it easier to light and get the carbon monoxide down.

Q. Let me go back just so I can establish on the record. You were involved with Eclipse from its inception?

A. Yes.

Q. What was your role with regard to Eclipse?

A. Well, I was in management and the groups that were developing and researching GTC which later became Eclipse worked for me. It also had a marketing acronym called XD. Within RJR R & D, the Eclipse projects was known as XD early on.

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Q. Uh-huh.

A. And we if we were looking at it for Europe, it was XDU. If we were looking at it for Japan, it was NN or NA.

Q. What was it? NA?

A. NA is what it came to be called. I believe early on it was called NNN, if my memory is correct. These at one point -- at a point in time after we interacted with the Japanese company, they wanted to go off on their own and do their own thing so we let them. So we didn't help them anymore.

So as we -- as you asked earlier, we stated -- I stated, it became a cross-license agreement after that, this licensing technology. For the XDU project, that ended up being High Q in Germany and Inside in Sweden.

Q. You said there was some prototypes that you had done nicotine blood levels and carboxyhemoglobin levels and saliva tests on. Who did you do those on with regards to Eclipse?

A. They were employees that we recruited. We'd tell them what the test was about and what was going to be done. And if they were interested, we'd let them do it.

I don't want to over-emphasize the saliva. We

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did that for a while. Whether we kept doing it or not, I don't think we did. We felt like the three parameters to take were blood nicotine, carboxyhemoglobin in the blood and expired CO, which we wanted to look at expired CO versus carboxyhemoglobin to make sure, like for other cigarettes, it was a correlation for Eclipse. And there is, just like for other cigarettes.

Q. Was Eclipse ever tested on an outside competitor's panel?

A Not in that way, no.

Q. In any way?

A Obviously we tested Eclipse with consumers, but no blood, no COHB or exhaled CO was done.

Q. And not a panel? It was actually test marketed in Chattanooga itself?

A. Yeah, but you do consumer tests before you go in and we had done that with competitive smokers, but no blood or stuff like that taken.

Q. So the only -- the only health data testing blood, saliva if it was done, was done on RJR employees?

A. Yes. We -- we did one test where we looked at Chattanooga smokers smoking our product after test market, looked at one of the prototypes to see if

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their exhaled CO was any different. It was a very brief test. We thought we were onto something to lower carboxyhemoglobin and we wanted to know what those smokers exhaled CO showed, so we did a brief test there.

Q. What did the nicotine blood serum levels show that were tested?

A. They are the same or lower -- slightly lower as their regular brand. They are often slightly lower, but they are not low enough to be statistically different.

Q. And what about the carboxyhemoglobin?

A. It tends to be in the same range as the regular brand. In our earlier prototypes, they could average slightly higher, but in the later prototypes, they are the same.

Q. And has --

A. That's why we worked on it.

Q. Has all of the subjects that Reynolds has done blood or urine testing on or collected other health data on along those similar lines, like saliva, always been done on RJR employees?

A. Yes, I believe so with the exception of that one group of Chattanooga smokers who did exhaled CO. To the best of my memory, they are all RJR employees.

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Q. Were any of those employees' medical records also looked at?

A. Yes, we have a committee and they are looked over. We have our medical department make sure that they are healthy subjects and don't have any health concerns that would make them not a good test subject.

Q. Now, you said that there is a glass mat that's used in Eclipse and that the glass cannot be inhaled?

A. That's right.

Q. How do you know that?

A. Well, it's -- we designed it so it couldn't be inhaled dimensionally.

Q. You mean the full-body glass itself?

A. The filaments that make it up.

Q. Was there --

A. They are too -- they are too big. They are too long. They are too wide. It's well known in human medicine and in inhalation toxicology what size a filament or a fiber or a particle has to be before it can be inhaled. And this is many, many, many times bigger than that.

Q. Did RJR do any testing prior to marketing?

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A. Uh-huh.

Q. And what testing was done?

A. We do transfer to see if there's any filaments coming across. There are none. We did electron microscopy to assure that filaments fuse, and they do.

In our inhalation studies of animals, we have cascade impacters that would show you if any filaments came through. And when we do histology on the animal studies, if any filaments would be there, we would see them.

Q. So you did --

A. And all of those were negative. Plus we designed them so they couldn't possibly be inhaled, but there are tests to confirm it.

Q. And those were inhalation studies?

A. Yes. We've looked --

Q. They were done in-house?

A. They were done in-house as well as some were done at Baettele Northwest. You have a way to pick up particles when you do an inhalation study. It's called cascade impacters. We also on our transfer studies would pick up any fibers coming through. And we know from the way we design them, that they are far too big to be inhaled.

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And secondly, when they are lit, they fuse together and get even bigger. And we've confirmed that with electron microscopy. We've also done tests that are traditionally-honored tests to show that in the strange, highly unlikely event any piece of a filament got into the lung of an animal or a person, it would dissolve because we designed that fiber or filament -- which it should be called a filament. That's the correct term for it. We designed the filament by toxicology concerns. Too big to inhale.

If it ever broke or got traumatized, it would not break in such a way that it would make an inhalable particle. And it's made up -- it's sodium and calcium ion content is such that it would dissolve in biological fluids. We've also proven that with tests.

Q. And these tests were all done prior to test marketing?

A. Uh-huh.

Q. Do you know who John Paluly is?

A. Un-huh, sure do.

Q. Who is he?

A. He's a scientist up at Roswell Park who had published some work on cellulose acetate tow in cigarettes and claimed that it might be a problem in

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smokers.

Q. Has he done work on these gas fibers and the mats of the Eclipse?

A. He certainly has gotten cigarettes from us and glass filaments. I don't know what work, if any, he's done.

Q. Would it surprise you that his work seems to indicate that glass fibers are transferring from Eclipse into smokers' mouths, throats and lungs?

MR. BELASIC: Object to the form. If you've got a specific study, otherwise I'm going to object to your representation that some unknown scientist in some unknown publication seems to indicate in your opinion.

Q. You can answer the question.

A. It would surprise me if any -- it shows any lung presence of any filaments from our cigarettes. He certainly believed in the publication he had early last year that he had acetate tow fibers in a lung section of a patient from cigarettes. I know of no publications he's done or studies showing that for Eclipse. We have studies that show that if any unlikely event or any part of one of these filaments got in the lungs, they would dissolve.

Q. Eclipse has also been code named GTC?

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A. Yes.

Q. Is that correct?

A. Uh-huh.

Q. E.W. is the Winston Select in Oklahoma City?

A. Yes.

Q. What is the Winston Natural? Did that have a code name?

A. NN is what it was called.

Q. And Premier was?

A. Premier had several different names. It was called Spa, later Alpha and then Premier is the ones I remember.

Q. You said that in the glass material, the C matting in the Eclipse, that they are better described as filaments?

A. Yes.

Q. How are the filaments put into a solid mat? I assume it's a solid mat of glass. What holds them together?

A. You have a pectin, a natural pectin that's used in food materials, jellies and that sort of thing. You put that in there to -- a food-grade pectin to glue the filaments together in the mat. Takes a special glass manufacturer to be able to do that.

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Q. Was the toxicity of that pectin tested when it burns?

A. It has been in other uses.

Q. When it's pyrolyzed?

A. Pectin -- we know the chemical pectin is like the pectin in tobacco. It's like the pectin in fruit used in jellies, same kind of stuff.

Q. And it was tested when it was pyrolyzed?

A. It has been looked at, that kind of material for pyrolysis products.

Q. And it has no toxicity?

A. I don't know of any, but you'd have to ask Dr. Suber what the extent of the data is on that. It was approved by he and his group and it had to be a certain kind of pectin, or it couldn't be used.

Q. Did Reynolds do any of its own toxicological -- toxicology testing on it?

A. Bob was involved early on when we -- you know, back in the Premier days on what kind of chemistry was done. I don't know if other kinds of tests were done in-house, or if the data from it was available out of house. But it's a food grade considered -- generally recognized as safe material.

Q. In the production -- and Eclipse is currently in production, correct?

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A. Yes.

Q. Do you monitor the air in the facilities that it's in production for glass filaments?

A. Yes.

Q. Have you found any?

A. When we -- we have at times found some that are uninhalable. But even though they are, we have kicked up the controls for the facility.

Q. Are there any chemicals in Eclipse cigarettes that are not present in other cigarettes?

A. In the tobacco, there are no materials that are not used in other cigarettes. Obviously the carbon heat source is not used in other cigarettes. The glass mat is not used in other cigarettes.

Q. Are there any chemicals produced through the heating process that are either at higher levels than other cigarettes, or are new chemicals from other cigarettes?

A. No. There obvious -- the water in glycerol is higher than other cigarettes. They're present in other cigarettes, but they're higher in Eclipse. The other materials are the same or lower than other cigarettes.

Q. What is furlural? F-u-r-l-u-r-a-l?

A. Furfural.

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Q. Furfural?
A. It's a compound that's from sugar heat reactions. It's considered. And it is in Eclipse and it's there in the levels that's found in lights, cigarettes of other brands.
Q. Is it greater in the vapor phase of Eclipse than it is in regular cigarettes?
A. I don't know. Its total presence in Eclipse smoke is the same or less than other cigarettes. I'd have to go back and look and see which -- whether it's vapor or particulate. I don't recall.
Q. Is furlural --
A. Furfural.
Q. Furfural. Is furfural, is it bioactive?
A. It has been classified as a possible animal carcinogen and there is a big war going on in Washington, FDA and other places arguing that it is not a carcinogen. I don't know how that's going to come out. It's a pyrolysis product of tobacco being burn. It can be a pyrolysis product of any protein in sugars. As I've said, it's in other cigarettes.
We, as far as I know, are the only labs in the world look at furfural in smoke. Maybe since we've been publishing it, others have started, but we were the first and may be the only still yet.

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Q. Are there any other chemicals that are higher than ultra light cigarettes?

A. Depending on which brand you look at, acrolein might be slightly higher. Some of the prototypes, formaldehyde was slightly higher than one or two milligram cigarettes. It's the same now.

Q. Are -- I'm sorry.

A. Go ahead.

Q. I didn't mean to cut you off.

A. Acrolein is the same as many ultra low tar cigarettes, slightly higher than others.

Q. Are formaldehyde and acrolein bioactive?

A. They are considered possible animal carcinogens. There are debates on acrolein like there are for furfural. Formaldehyde is considered an animal carcinogen. At higher -- at much, much, much higher levels than are in cigarettes.

Q. And --

A. And even more higher than they are Eclipse.

Q. In full-flavored Eclipse, what level of formaldehyde is present?

A. I don't remember off the top of my head. I'd have to go dig out. It's in the ultra low tar range, but I don't remember.

Q. Do you remember what acrolein was?

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A. Same way. It's down there in the ultra low tar range, but I don't remember the exact number.

Q. Yesterday we talked about labs -- that outside labs that Reynolds has used. And I believe you mentioned a couple of them. One was A. D. Little. And you said they completed the work that you'd requested, but that you chose to go with another lab after that. Has Reynolds had any difficulty finding what it views as qualified outside labs to test their cigarettes?

A. No, we haven't had any problems.

Q. Have you ever had occasion to send any in-house employees to train staff in any of these labs?

A. We sent some up to A. D. Little to help them with theirs. We have -- we have what's widely recognized as the best inhalation toxicologists for cigarette. We have -- we have sent our inhalation toxicologists to universities who want to look at animal studies, whether or not they had anything to do with our funding. For example, there's some labs in California that ask for our help.

We have acquainted Baettele Northwest, both Ohio and Richland facilities, with smoking machines which was a modification of the ones they already

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used. They use the Baettele Geneva model. We had improved that model so we showed them what the improvements were and how to use it.

Q. I guess this kind of begs the question, but if there are better people and better processes at Reynolds in-house and Reynolds has to go outside to train or teach people the better or newer processes in Reynolds' opinion, why does Reynolds use outside laboratories?

A. Well, because people like Dr. Paluly believe that it's not good work unless it's done by people who don't work for the company. So we occasionally do both. It apparently has turned out to be a wise decision because it satisfied a lot of critics, both in Premier days and Eclipse days that the work has also been done or similar work out of house and came up with the same conclusions.

Q. Even if those people are trained and --

A. Yeah.

Q. -- trained by Reynolds people to run Reynolds experiments?

A. To run experiments they do on contract for us to show on the equipment we've developed. They can use their old equipment. We gave Baettele Northwest that option. And they felt like the dosimetry and

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the control level was far better on our designed equipment. Which we took their equipment and put better computer controls on it.

That has been published, well-received in inhalation toxicology. We brought computer controls of complex mixture exposures to laboratory animals into the modern age.

Q. Why is it that Reynolds chose to cease using A. D. Little and go to Baettele?

A. Well, I was one of the main reasons for that. I had worked at DuPont and Rohm & Haus. And I had come to accept a higher standard than I felt A. D. Little was giving us. They're good people, but I thought we could do better.

We looked at Baettele Northwest because they do the national toxicology program inhalation studies. They are the sole labs for doing it. They are the labs the federal government considers the best in the world and uses them practically exclusively, probably exclusively. So we thought that's what we ought to do. That's why they were selected.

Q. Is there any other connection between Baettele and Reynolds?

A. I knew a pathologist up there. I didn't know the rest -- I knew two pathologists. I had been to

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meetings and met them. Dr. Arnold Mosberg used to work at Baettele Ohio, not Baettele Northwest. He knew them because they were a member of the Baettele family. He thought within the Baettele family and within the industry, Baettele Northwest -- even though he didn't work there -- was the best inhalation tox lab in the world. I agreed with them. So we were familiar with them.

Toxicology is not that big a world. You tend to know most of the people. I went after Dr. Mosberg because of Baettele Ohio's reputation in physiology. And he's a world-class physiologist as well as toxicologist. He expressed an interest in working at Reynolds. If some of the people at Baettele Northwest had expressed that interest, I would certainly have gone after them as well and recruited them. They didn't. They haven't expressed an interest to do so.

MS. KNISELY: Did we want to go off the record? Let's go off the record.

THE VIDEOGRAPHER: We're going off the record at 5:11 p.m..

(DISCUSSION OFF THE RECORD.)

THE VIDEOGRAPHER: We're going back on the record at 5:13 p.m..

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MS. KNISELY: When we had come back from lunch, I'd asked the witness, Dr. Burger, if there was a particular time he wanted to or needed to leave, and he had indicated he would prefer five. However, I understand the offer is there that should an additional hour or hour and a half or whatever wrap up this deposition, that both he and his counsel, Mark Belasic, would be willing to do that and I appreciate that offer. It appears at this point, however, that the amount of questions still to be had would exceed that time period.

Additionally, there are documents that were produced by Dr. Robinson, who was part of R & D for the period of time that the witness is head of R & D that were produced to us last evening that we need to go through for any questions we may have of this particular witness. With that regard, there is also the outstanding production of document request that we had put on the record yesterday. That was part of this deposition notice.

And we had gone through with the witness today the documents that may be responsive to that in terms of his office. And hopefully we will be able to work out with defense counsel the production of the categories of documents that we believe necessary

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and would want to review those and have an opportunity to discuss those with Dr. Burger.

And I understand that counsel -- defense counsel may object to the production of those on a variety of reasons that he may speak to. And it may be necessary to approach the Court in that regard should we not be able to reach an agreement on our own without their -- without the Court's intervention. So at this point, while I appreciate the offer for the hour or so, I don't think that would conclude the deposition.

MR. BELASIC: I think plaintiffs' counsel's representations of the situation are largely correct. We have produced Dr. Burger for two full days and we're willing to produce him for another hour or hour and a half, but it doesn't seem like that's going to resolve the issue.

Reynolds disagrees with the notion that the Robinson documents are relevant or necessary here. And we disagree with the validity of the document request for reasons that we don't have to go into here. So I think that everyone has agreed that this issue is going to be resolved later through some means. So I think we're done.

MS. KNISELY: For the day.

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THE VIDEOGRAPHER: We're going off the record at 5:15 p.m..

(SIGNATURE RESERVED.)

(DEPOSITION CONCLUDED AT 5:15 P.M.)

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JURAT

I, GARY THOMAS BURGER, do hereby certify that I have read the foregoing transcript of my testimony, Volume 2, taken on August 22, 1997, and have signed it subject to the following changes:

PAGE	LINE	CORRECTION
See attached 2 page errata sheets		

Gary T Burger

DATE: 10/13/97

Sworn and subscribed to before me on this 13th day of October, 1997.

NOTARY PUBLIC: Carol P. Holland

OFFICIAL SEAL
CAROL P. HOLLAND
Notary Public-North Carolina
COUNTY OF FORSYTH
My Commission Expires
February 27, 2000

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STATE OF NORTH CAROLINA

COUNTY OF DURHAM

C E R T I F I C A T E

I, Cathy Jones, a Notary Public in and for the State of North Carolina, do hereby certify that there came before me on August 22, 1997, the person hereinbefore named, who had been previously sworn to testify to the truth and nothing but the truth of his knowledge concerning the matters in controversy in this cause; that the witness was thereupon examined under oath, the examination reduced to typewriting under my direction; and the transcript is a true record of the testimony given by the witness.

I further certify that I am neither attorney or counsel for, nor related to or employed by, any attorney or counsel employed by the parties hereto or financially interested in the action.

IN WITNESS WHEREOF, I have hereto set my hand and affixed my official seal, this the 12th day of September, 1997.

Cathy Jones

CATHY JONES, NOTARY PUBLIC
My Commission Expires: 1-18-99

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Deposition for Gary T. Burger
Arch vs. American Tobacco Company, Inc., et al.
Thursday, August 21, 1997
Volume 2

PAGE	LINE	CORRECTION
5	6	D.V.M. (instead of *Ph.D.*)
11	16	de-nicotinization (instead of *de-nicatinization*)
34	2	Doull (instead of *Dr. Duel* and *John Duel*)
37	25	Alarie test (instead of *allergy test*)
53		Page 53 is duplicated twice
59	23	Byrd's (instead of *Bird's*)
69	11	Verbandt (instead of *Verbont*)
72	4	Morse (instead of *Morris*)
77	6	DAP (instead of *BAP*)
84	14	Dube (instead of *Doobie*)
85	15	Dube (instead of *Doobie*)
91	25	D.V.M. (instead of *Ph.D.*)
96	11	Tinsley (instead of *Tensley*)
96	13	Tinsley (instead of *Tensley*)
101	1	Shelar (instead of *Sheeler*)
101	20	paper (instead of *pipe*)
102	1	Hoechst Celanese (instead of *Herselameese*)
102	2	American Filtrona (instead of *Mariton Filtrona*)
110	2	Alarie tests (instead of *allergy tests*)
110	5	Alarie (instead of *allergy*)
112	21	Steichen (instead of *Stiken*)
122	21	No, I did not. (instead of *No, I did.*)
124	20	Tinsley (instead of *Tensley*)
125	5	Bertie County (instead of *Bayden County*)
125	17	fluorescence (instead of *florescents*)
130	22	PT&D (instead of *P-10-D*)
133	9	tight (instead of *typed*)
133	18	analogs of (instead of *analogs in*)
135	3	Don deBethizy (instead of *John deBethizy*)
135	4	Don deBethizy (instead of *John deBethizy*)
135	24	Weber (instead of *Webber*)
141	1	Weber (instead of *Webber*)
141	5	Weber (instead of *Webber*)
141	7	Weber (instead of *Webber*)
141	9	Schroer (instead of *Shrarer*)
141	11	Weber (instead of *Webber*)
141	11	Schroer (instead of *Shrarer*)

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PAGE	LINE	CORRECTION
141	12	Weber (instead of *Webber*)
141	19	Weber (instead of *Webber*)
142	15	Newport (instead of *New Port*)
143	2 & 3	Newport (instead of *New Port*)
148	14	Muri-stemming (instead of *mirror stemming*)
149	8	Muri-stemming (instead of *mirror stemming*)
152	4	Pierre De Labouchere (instead of *Pierre de la Basheer*)
152	15	without Jim (instead of *without – Jim*)
152	16	Johnson, since he's the one (instead of *Johnson is the one*)
153	7	I have done forgot (instead of *I done forgot*)
166	3	as waxes do (instead of *a laxis do*)
168	11	how would we do that (instead of *how would do that*)
178	24	Alarie test (instead of *allergy test*)
196	6	amount (instead of *mount*)
196	19	calcium carbonate (instead of *calcine carbon*)
197	6	Alan Norman (instead of *Allen Norman*)
197	13	Alan Norman (instead of *Allen Norman*)
198	6	calcined carbon (instead of *calcine carbon*)
198	19	alumina (instead of *lumina*)
202	10	Rod (instead of *Road*)
212	22	alumina (instead of *lumina*)
213	11	1981-1983 era (instead of *1881 [sic], '83 era*)
213	17	alumina (instead of *lumina*)
217	21	Morse (instead of *Morris*)
235	13	D.V.M. (instead of *Ph.D.*)
246	15	Hi-Q (instead of *High Q*)
251	20	Pauly (instead of *Paluly*)
259	10	Pauly (instead of *Paluly*)

Signature: Gary V. Burger

Date: 10/13/97

Subscribed and sworn to before me this 13th day of October, 1997

Carol P. Holland
Notary Public

My commission expires: February 27, 2000

OFFICIAL SEAL
CAROL P. HOLLAND
Notary Public-North Carolina
COUNTY OF FORSYTH
My Commission Expires
February 27, 2000

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